



FRIDAY, DECEMBER 8.

The Late William S. Hudson.

The following memoir of Mr. Hudson has been prepared for the forthcoming report of the Master Mechanics' Association:

The death of William S. Hudson occurred at his residence at Haledon, a beautiful suburb of Paterson, N. J., on the night of July 20, 1881. He was 72 years of age at the time of his death.

He was born near the town of Derby, England, in 1809, and at an early age began to learn the trade of an engineer and machinist, serving part of his apprenticeship under George Stephenson. In 1833, when 24 years of age, he came to this country, and for a time found work in the engine-room and machine shops attached to the Auburn State Prison in New York. He soon left that place, however, and engaged as a locomotive runner on the old Rochester & Auburn Railroad, now a part of the New York Central. Subsequently he ran an engine on the Attica & Buffalo Railroad, and was made Master Mechanic of the road, which he left in 1852 to become Superintendent of the locomotive works of Rogers, Ketchum & Grosvenor, at Paterson, N. J. In 1856 these works were incorporated as the Rogers Locomotive & Machine Works, and Mr. Hudson was made Mechanical Engineer and Superintendent, a position which he held until his death. He succeeded Mr. Thomas Rogers, who was the founder of these works, and who probably did more than any other man to develop the design and improve the construction of the American engine as it is to-day. But Mr. Hudson took up the work where Mr. Rogers left it, and during the 30 years that Mr. Hudson occupied the position of the head of the mechanical department of this establishment, he made many improvements in the locomotives built there, chiefly of a kind which are the result of simplifying details, adopting better methods of putting work together, and making the engines more substantial and more serviceable. He studied, as probably no other locomotive-builder did, the performance of the engines he built. He was constantly looking out for their weak points, and it was said by the present head of the establishment that Mr. Hudson was always more concerned about building a good engine than he was in making a good profit.

He was a very watchful superintendent, and was constantly looking after the minute details in the shops and seeing that the tools, the machinery, the material, the processes and the men were suited to the purpose for which they were employed.

But while most of Mr. Hudson's time was devoted to improving the construction of the locomotives built in the shops which he superintended, he also had a great love for original investigation and was a prolific inventor.

In 1861 he patented a process for welding an upper thick section to a lower thinner part of a tube-sheet.

In 1865 he took out a patent for operating safety-valves.

In 1867 a patent was granted to him for a locomotive with a single axle, or half-truck, at each end, and with two pairs of driving-wheels between them. The advantages set forth in the patent for this engine were, first, that it would run equally well with either end foremost; second, that the load was equalized between the rear driving-wheels and the rear truck, and the front driving-wheels and the front truck, the truck-wheels at the same time being free to move laterally. A number of these engines were afterward built with tanks on top of the boiler.

On July 16, 1872, six patents were granted to him for improvements in tank locomotives. The patents covered three types of engine, all with outside cylinders and with frames extended back of the fire-box to carry a water-tank behind. One type had two pairs of driving-wheels, all located between the smoke-box and fire-box, and with a half or Bissel truck in front of the cylinder and a four-wheeled truck behind the fire-box. The second type had, besides the tank behind, two side tanks alongside the boiler, and three pairs of driving-wheels, two between the fire-box and smoke-box and the other pair behind the fire-box. It had a half-truck in front of the cylinders and another similar to it under the tank and extended frames behind. In the third type of engine not only were the rigid frames extended behind the fire-box, but they were also carried forward in front of the smoke-box, and a water tank was carried on the extensions of the frames at each end of the engine. There were no side tanks on this engine. It had three pairs of driving-wheels, all located between the fire-box and smoke-box, and had two four-wheeled trucks, one under the extended frames in front of the cylinders and the other behind the fire-box. The king bolts of the trucks of these engines all had "lateral motion" and an elaborate system of equalizing levers was employed. The springs of the first trucks, in the

first and third type of engine, were connected with the springs of the driving-wheels. The springs of these wheels were all connected together. In these plans the rear trucks were not equalized with any of the driving-wheels. In the second type the front half-truck was connected to the front driving-springs by equalizing levers, and the rear truck and the two pairs of rear driving-springs were all connected together in a similar way.

The other patents of July 16, 1872, referred to the details of construction of engines of the plans described.

In 1873 Mr. Hudson took out a patent for a compound locomotive with a superheater in the smoke-box. The steam from the small cylinder was to be exhausted "into a chamber surrounded by the products of combustion in the smoke-box, from whence it is led in a dried and more or less superheated condition into the other cylinder."

The engine was of the ordinary pattern, but the cylinders "are preferably different in size, the one which ordinarily receives the live steam being only about three-fourths the diameter of the other." There was also an arrangement by which live steam could be used in both cylinders. The plan was never put into practice.

In 1876 a reissue was taken of the patent of 1867.

In 1877 a patent was granted to Mr. Hudson for a spark-arrester, the chief peculiarity of which was a deflector with "curved screw-blades." In 1878 he patented a corrugated crown-sheet for locomotives, which was supported by crown-bars.



Yours Truly
W. S. Hudson

His patents and his practice showed his appreciation of the importance of equalizing the weight of locomotives on their wheels, or arranging them so that an excess of weight on one wheel would be transmitted to the others. In his patents he elaborated this principle until it laid his plans open to the charge of being unnecessarily complicated. He was also one of the first engineers to appreciate the value of "lateral-motion" trucks for locomotives, and he applied them, in some form, to very many of the engines he built.

He also studied the principles of valve-gear probably more thoroughly than any other man in the country, and he understood the working of the link-motion and what could and should be accomplished by it in the distribution of steam as perhaps no other living engineer did.

His mind naturally seemed to aim at utility in the design of machinery, and he seemed to pay little regard to grace or beauty for their sake alone. He had little patience with carelessness or dullness and enjoyed original research more than anything else, or, as one of his assistants expressed it, "when he was investigating any subject he was in his pleasantest moods."

The members of the Master Mechanics' Association had abundant opportunity to judge of the gentleness and modesty of his disposition, and withal, the annual records of the Association bear ample testimony, in the reports of the discussions in which he took part, of the clear, strong and vigorous character of his thinking and speaking. Any one listening to his conversation, either in private or public, would always be struck with the impartiality and reasonableness of what he said.

Although he achieved a very considerable measure of worldly success, no one well acquainted with him could help

seeing that his whole character was tinged with a sadness which was inexpressibly touching to them who knew its cause. He had three daughters, only one of whom is now living, and one son. During the war this son volunteered and entered the army and was severely wounded. Although he recovered temporarily, the injury to his constitution was lasting, and finally caused his death. This great sorrow left the father's life surrounded with a haze of sadness which lasted till his death.

To the Master Mechanics' Association his loss is irreparable, and it is literally true of it, as it is of many of his friends, that any other man could have been spared better than he. His life was an illustration of that true nobility of character which is self-made, and which is developed when the gates which lead to advancement from the ranks are left open. No adventitious circumstances, such as birth, wealth or scholastic technical education aided him. He made his own career by his industry, integrity and energy, combined with an insatiable appetite—it may be called—for knowledge. His life is a good example for young men, its history is an encouragement to those of middle age, and to the old it is an illustration of how a useful life may be lived and how when it is ended its memory will be honored and loved.

M. N. FORNEY.

The Kinzua Viaduct.

Some years ago, during the administration of President

Watson of the Erie Railway, he purchased for the company a large tract of coal lands in Elk and Jefferson counties, Pennsylvania, embracing 27,000 acres of the coal land of that district. Connected with it was a railroad about five miles long, leading from the coal lands to the Philadelphia & Erie Railroad at a station called Daguschonda, about five miles east of Ridgeway, Pa. These mines have been worked constantly ever since Mr. Watson's time in a moderate way, under the disadvantages incident to an inclined plane from the mines to the top of a high elevation between them and Daguschonda station, limiting the maximum output to about 800 tons per day. When this coal reached the Philadelphia & Erie Railroad it passed by a circuitous route to its destination on the main line of the Erie Railway, by the way of Emporium to Olean on the east, and by a still more circuitous route to Buffalo by way of Warren on the west. In spite of these disadvantages the property has always been moderately profitable to the Erie Company. The demand for this coal in Western New York, Buffalo and lake ports rendered it desirable that the company should build a more direct line to the coal lands, from which it is thought that an output of 3,000,000 tons per annum can be marketed.

The Erie Company, by reason of its ownership of nearly the whole of the capital stock of the Buffalo, Bradford & Pittsburgh Railroad, controls a line of road from Carrollton on its Western Division, 407 miles west of New York, to Alton in McKean County, 24 miles south of Carrollton. From this point it was determined to construct a first-class railroad southwardly by a direct line to the above-mentioned coal fields.

For this purpose the control of the charter of the Wilcox & Howard Hill Improvement Company was procured; its corporate name was changed to the New York, Lake Erie & Western Coal & Railroad Company, and Mr. Oliver W. Barnes as Chief Engineer located a railroad line from Alton to the coal fields.

The characteristics of the first division of this new road, which is now completed and open for use, are somewhat extraordinary. In proceeding southwardly from Alton station, which is situated on the top of the Allegheny Mountains 2,100 ft. above tide level, the line encountered the deep and wide valley of Kinzua Creek, about three miles south of Alton, necessitating a crossing on an iron viaduct 2,053 ft. long and 301 ft. high above the bottom of the valley. After crossing it the line passes by an ascending grade of 45 ft. per mile, continued for two miles to the top of the Allegheny Mountains, at Howard Hill, attaining an elevation of 2,190 ft. above tide level, from which point the line follows the course of the mountain crest partly with undulating grades of 12 ft. per mile, partly level for a distance of four miles, and thence descends into the valley of the Clarion, with a maximum grade of 58 ft. per mile and other lighter grades to a point near Johnsonburg, on the Philadelphia & Erie Railroad; thence, still following the Clarion Valley, the line passes Ridgeway and Brockwayville, whence a branch 12 miles in length diverges to the company's mines near Earley Station, in Elk County. The grades along the Clarion are very favorable, not exceeding 12 ft. per mile. The grades from the mines to the Clarion Creek are all planes descending in the direction which the coal tonnage passes on its way to Alton. At a point near Brockwayville, 54 miles from Alton, a branch is to be constructed, eight miles in length, to connect with the Allegheny Valley Railroad at Falls Creek station, 126 miles north of Pittsburgh, thus forming a line of inter-communication between the system of railroads which centre at Pittsburgh and the New York, Lake Erie & Western system. The distance from Pittsburgh to Buffalo by this route will be 280 miles.

The division about to be opened is the first 30 miles south of

Alton and connects at Johnsonburg with the Philadelphia & Erie Railroad, by which the company's coal will be brought from Daguseahonda, 12 miles distant, temporarily, whilst the connection from Johnsonburg via Brockwayville to the mines, as above described, is being constructed.

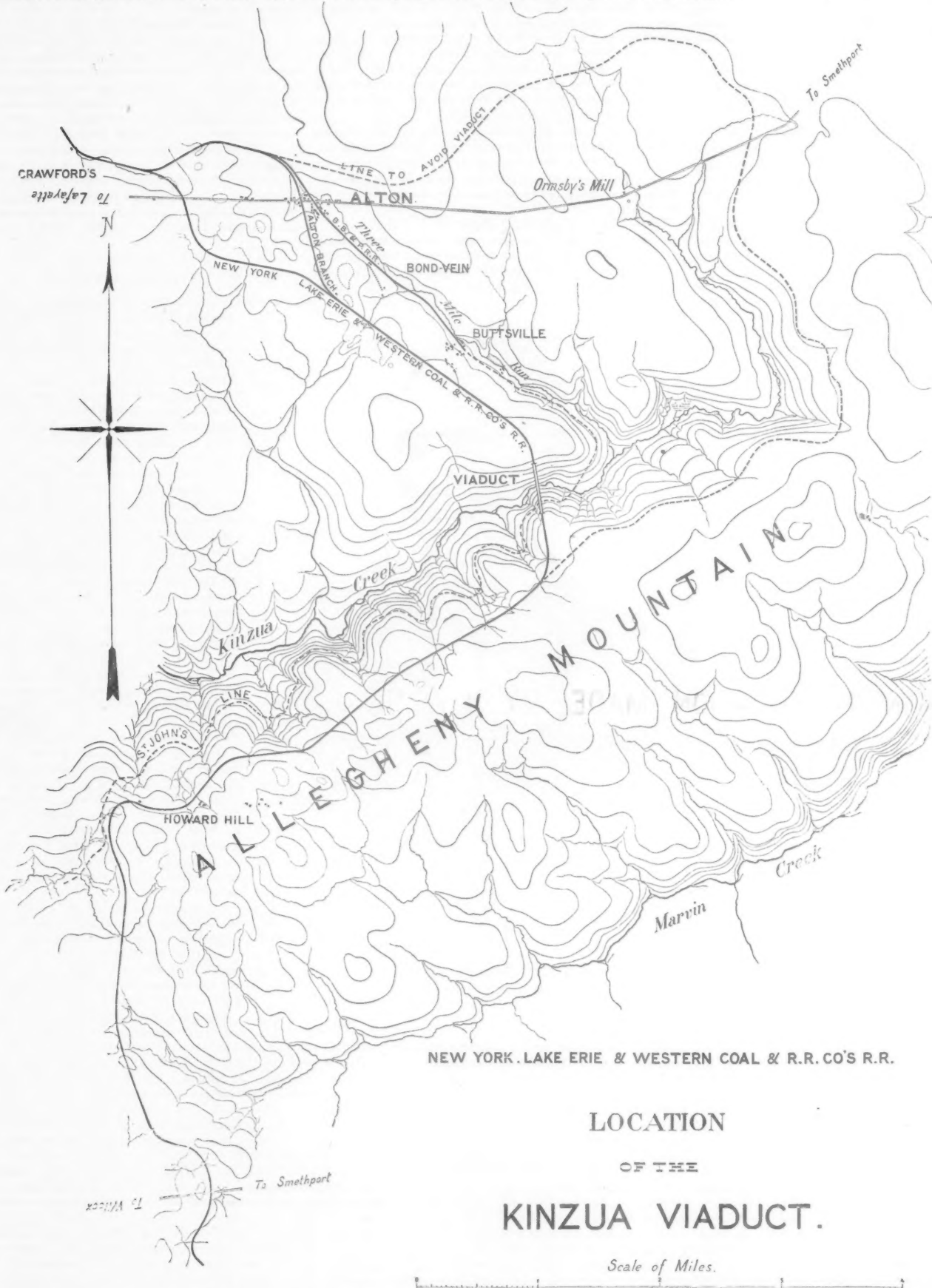
The portion of the road just opened is constructed in the best manner with a heavy steel rail track. It passes through a very rugged country, with much heavy rock cutting. There are, however, no bridges or other costly structures,

east of the mouth of Three-Mile Creek; thence ascending on grades of 70.8 ft. per mile, reduced on sharp curvature, which was required to fit it to the steep hillside on the southern slopes of the valley, the summit of the Allegheny Mountain was reached at the same point near Howard Hill as by the first line. This line is shown in profile in fig. 3.

The third line, shown by a full line in the map, and in profile in fig. 2, is the one now constructed; it begins near Alton, descends by a grade of 15 ft. per mile along the crest

the tonnage tributary to the line, having been made, the short and level line, by the way of the high viaduct, was found to be the best, and was therefore adopted.

The high elevation and breadth of the mountain at Alton summit and also at Howard Hill summit precluded the adoption of a tunnel line at a lower elevation, the only way by which the height of a viaduct across the Kinzua could be much reduced, on any line other than the detour above mentioned.



except the great viaduct across the Kinzua Valley above mentioned.

Very extensive surveys were made by the Chief Engineer, Mr. Oliver W. Barnes, before the location for this viaduct was finally adopted. Three lines of location were made, which are shown on the maps published herewith. One upon a long detour (represented by a dotted line in the upper right-hand corner of the map), with curved alignment, around the heads of Kinzua Creek, 12 miles in length, requiring an undulating grade of 58 ft. per mile, in order to pass the various swells and depressions of the ground at the heads of the Kinzua Creek.

A second line (shown by the dotted line in the centre of the map) was also located, descending from Alton on a grade of 52.8 ft. per mile, to a crossing of the Kinzua 125 ft. high,

of a mountain spur, with direct alignment to an elevation of 2,065 ft. above tide level, at the crossing of the Kinzua, the grade at this point being but 35 ft. below the Alton summit; this elevation enabled the engineer to take advantage of favorable ground along the flank of the Allegheny Mountains above the heads of numerous deep ravines which cut the slopes between the viaduct and Howard Hill, and thus obtain a line free from objectionable curvature.

This location, however, required a bridge 2,053 ft. long and 301 ft. high in the centre, at the crossing of the Kinzua Creek. This structure, the largest of its kind in the world, is represented in profile in the double-page engraving with this number of the *Railroad Gazette*.

A comparison of the merits of these three lines of location, having reference to the character, direction and amount of

The great viaduct across the Kinzua having been determined upon during March, 1881, proposals were invited for the structure from the principal iron bridge builders in the country. These were received and considered during the month of May following, and the general plans and proposals submitted by Messrs. Clarke, Reeves & Co., of the Phoenixville Bridge Works, were approved and accepted. No expense has been spared to make this, whilst it is the largest work of the kind in the world, also one of the strongest and safest.

It consists of 20 towers, each composed of four wrought-iron Phoenix columns. These towers are of uniform dimensions at the top, being 10 ft. in width and 38½ ft. long, and at the highest point of the structure they are 103 ft. in width and 38½ ft. long at the bottom. They are erected

upon square piers of cut stone laid in cement, placed one under each column. The spaces between these iron towers are bridged with 21 lattice girder trusses of great strength, each of 61 ft. span. They are bolted through oval holes to the tops of the piers upon which they rest; the manner in which they are thus secured allows for variation of temperature, which will not exceed 150 degrees Fahrenheit. The Phoenix columns composing the towers rest at their bases on movable plates, allowing for expansion and contraction of one inch transversely and 0.38 inch longitudinally, and are so fastened by proper anchor-bolts extending deep into the masonry, as to secure them and the whole structure against wind pressure. It was necessary to do this, inasmuch as the viaduct is exposed to the severe winds which prevail in the Alleghenies during the winter season.

Detailed engravings, showing the construction of the towers and the bridge spans, and others representing the method of erecting them, will be given next week.

Train Accidents in October.

The following accidents are included in our record for the month of October:

REAR COLLISIONS.

Early on the morning of the 1st a freight train on the New York & New England road ran into a preceding freight near Willimantic, Conn., doing a little damage.

On the night of the 2d a freight train on the Boston, Lowell & Concord line broke in two near Nashua, N. H.,

Del. The engine and four cars were wrecked, a laborer on the wood train killed and 11 others hurt. There was a dense fog at the time.

On the evening of the 7th a freight train on the Pittsburgh, Cincinnati & St. Louis road ran into a preceding freight near Sullivan, O., doing some damage.

Very early on the morning of the 8th a passenger train on the Pittsburgh, Cincinnati & St. Louis road ran into some cars which had broken loose from a freight train near Columbus, O., wrecking five cars. A signal was sent back for the passenger train, but there was not time. A tramp stealing a ride was killed.

About noon on the 8th an east-bound freight on the New York, Lake Erie & Western road ran into another freight train which was backing across the east-bound track into a siding at West Paterson, N. J. The engine was badly damaged and several cars completely wrecked. It is said that there were no signals out.

On the evening of the 8th a freight train on the New York Central & Hudson River road broke in two near Shortsville, N. Y., and the rear section ran into the former one, wrecking four cars and injuring a brakeman.

Very early on the morning of the 10th a freight train on the Intercolonial road ran into the rear of a repair train which was just going into a siding at Boundary Creek, N. B. Several cars were wrecked and two brakemen hurt.

On the morning of the 10th a passenger train on the East Tennessee, Virginia & Georgia road ran into a freight train which was standing on the track at Ooltewah, Tenn. The engine and two cars were wrecked, the engineer and another man killed. There was a dense fog at the time.

On the night of the 10th a freight train on the Chicago & Grand Trunk road broke in two near Flint, Mich., and the rear section ran into the forward one, wrecking several cars and killing a brakeman.

On the night of the 11th a passenger train on the Hanni-

Northern Pacific road ran backwards into a flat car at Norman, Minn., and the caboose was thrown over, injuring seven laborers.

On the evening of the 16th a pay train on the New York & New England road ran into the rear of a freight train in Providence, R. I., damaging the engine and a caboose.

On the evening of the 17th a passenger train on the Chicago & Alton road ran into some cars which had broken loose from a preceding freight near Towanda, Ill., wrecking two cars.

Very early on the morning of the 18th a freight train on the New York Central & Hudson River road ran into a preceding freight near Crittenden, N. Y., wrecking six cars.

On the morning of the 18th a freight train on the Central Railroad, of New Jersey, ran into the rear of a coal train near Cranford, N. J., wrecking several cars and injuring a trainman. There was a heavy fog at the time.

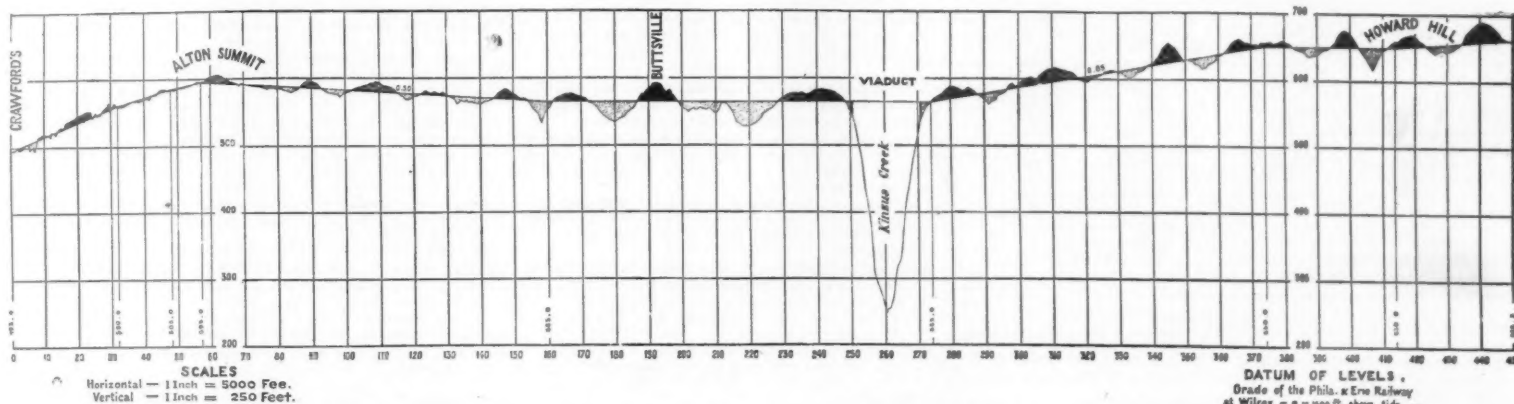
On the afternoon of the 18th a freight train on the Cincinnati Northern road became uncontrollable in Cincinnati, O., and ran down a steep grade to the terminus of the road, where it struck a passenger car standing on the track, forcing it through the station and across a street beyond. The engineer jumped and was hurt.

On the afternoon of the 20th a freight train on the Dunkirk, Allegheny Valley & Pittsburgh road ran into a preceding freight near Falconer, N. Y., damaging the engine and six cars.

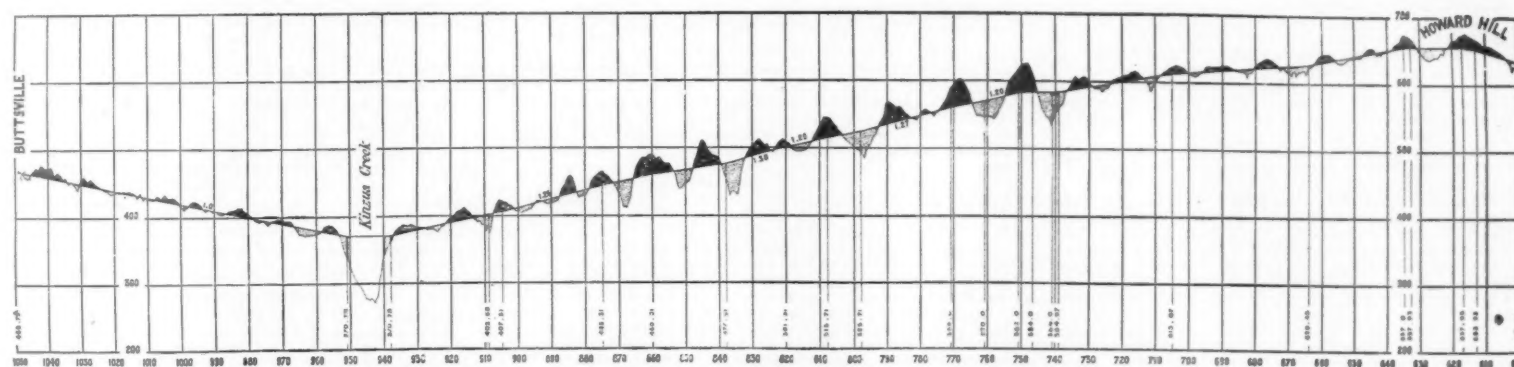
On the morning of the 22d a freight train on the New York, Lake Erie & Western road broke in two near Port Jervis, N. Y., and the rear section ran into the forward one on the bridge crossing the Delaware River and Delaware & Hudson Canal. The wreck broke down one span of the bridge and 15 cars went down in to the canal in a very bad wreck.

Very early on the morning of the 23d a freight train on the Chicago & Northwestern road ran into another freight

ADOPTED LOCATION MADE BY OLIVER W. BARNES, CHIEF ENGINEER. NEW YORK, LAKE ERIE & WESTERN COAL AND RAIL ROAD COMPANY. 1881.



PRELIMINARY LOCATION MADE BY H. A. ST. JOHN, CHIEF ENGINEER. 1878.



and the rear section ran into the forward one, wrecking 15 cars. A brakeman was hurt.

On the evening of the 21st an express train on the Atchison, Topeka & Santa Fe road ran over a misplaced switch and into the head of a local passenger train which was standing on a siding at Salem, Kan. Both engines and a baggage car were wrecked, the engineer, fireman, baggageman and a man riding in the baggage car were killed and four other passengers hurt. The switch was in charge of a new man, who became confused and turned it just as the express came up.

On the morning of the 3d a train on the Cheshire road broke in two near Winchendon, Mass., and the rear section afterwards ran into the forward one, piling up 14 cars in a bad wreck.

On the night of the 4th a freight train on the Manitta & Cincinnati road ran into a yard engine standing on the track in Chillicothe, O., doing some damage.

Very early on the morning of the 5th a freight train on the Baltimore & Ohio road ran into a preceding freight which had stopped at Laughlin, Pa., wrecking the caboose and several cars, killing two trainmen and injuring four others. The first freight sent back a flagman, but he did not go far enough.

On the night of the 5th a passenger train on the Wilmington & Northern road ran over a misplaced switch and into a freight train standing on a siding in Coatesville, Pa. Both engines and several cars were damaged and a brakeman hurt.

On the night of the 5th a freight train on the Wabash, St. Louis & Pacific road ran into the rear of another freight near Raymond, Ill., wrecking several cars.

Very early on the morning of the 6th a freight train on the East Tennessee, Virginia & Georgia road ran into a preceding freight, which had stopped at Blue Springs, Tenn., for water. Several cars were wrecked and two trainmen hurt.

On the morning of the 6th a Chicago & Iowa passenger train ran into the rear of an Illinois Central freight in the yard at Forreston, Ill. An engine and several cars were badly damaged.

On the morning of the 7th a freight train on the Delaware Division of the Philadelphia, Wilmington & Baltimore road ran into the rear of a wood train near Bridgeville,

bal & St. Joseph road ran into the rear of a freight train which was standing on the main track at Shelbyva, Mo. The shock of the collision was so great that it drove the freight train forward into another freight which was standing on the track facing it. Both freight engines, the passenger engine and a number of freight cars were wrecked and a brakeman hurt. A flag had been sent out to warn the passenger train, but it is said that the brakeman had neglected to couple the air brake hose and the train could not be stopped.

On the night of the 12th a freight train on the Lake Shore & Michigan Southern road ran into the rear of another freight, in Hudson, Mich., damaging several cars and injuring a conductor.

On the morning of the 13th a passenger train on the Fitchburg road ran into the rear of a freight train near East Deerfield, Mass., wrecking two cars. The express messenger was thrown down and badly hurt.

On the morning of the 14th a passenger train on the New York & New England road ran into the rear of a freight at East Douglas, Mass., making a bad wreck. The fireman was hurt.

On the morning of the 14th a passenger train on the Grand Southern road ran over a misplaced switch and into a freight train standing on a siding in St. George, N. B., damaging an engine and several cars.

On the afternoon of the 14th on the Jefferson Branch road at Thompson, Pa., some railway employes were moving a car loaded with wood down a switch by hand. The grade was steep, and the car gained such headway that the brakes could not hold it, and it ran down through the switch and on to the main line, where it crashed into a Delaware & Hudson passenger train, completely wrecking the locomotive. No one was injured.

On the evening of the 14th a freight train on the Wabash, St. Louis & Pacific road ran into the rear of another freight near Decatur, Ill., piling up 12 cars in a bad wreck.

On the morning of the 15th a passenger train on the Illinois Central road ran over a misplaced switch and into a freight train on a siding in Duquoin, Ill. The engine and several cars were damaged, the engineer hurt.

On the evening of the 15th a construction train on the

standing on the track at Baraboo, Wis., wrecking the caboose and injuring a brakeman.

On the morning of the 26th a passenger train on the Lake Shore & Michigan Southern road ran over a misplaced switch and into a freight train standing on a siding near Toledo, O., damaging several cars.

On the afternoon of the 28th a freight train on the New York Central & Hudson River road ran into a preceding freight at Amboy, N. Y., wrecking three cars.

On the afternoon of the 30th a construction train on the Ohio Central road ran into a flat car standing on the track at Lock-Six, W. Va. The car was wrecked, three laborers were killed and one hurt.

On the night of the 31st a freight train on the Louisville, Evansville & St. Louis road ran into the rear of another freight near Tazewell, Ind., wrecking several cars.

BUTTING COLLISIONS.

On the morning of the 6th, near Cedar Rapids, Ia., on the Burlington, Cedar Rapids & Northern road, there was a butting collision between a freight and a repair train, by which both engines and 16 cars were wrecked. It is said that both trains failed to stop for orders.

On the morning of the 6th there was a butting collision between two freight trains on the Intercolonial road, near Assametsquaghan, N. B. Both engines and several cars were wrecked.

On the afternoon of the 9th there was a butting collision between a freight and a ballast train on the Troy & Greenfield road, near Charlemont, Mass. Both engines and five cars were damaged. The freight train had been signalled, but did not stop.

On the afternoon of the 16th there was a butting collision between two freight trains on the Pittsburgh & Western road, near Wettmer, Pa. Both engines and a car were damaged.

On the night of the 16th there was a butting collision between a passenger train and a shifting engine in the Pennsylvania Railroad yard in Jersey City, N. J. Both engines were somewhat damaged.

On the night of the 17th, near Grand Rapids, Wis., on the Green Bay, Winona & St. Paul road, there was a butting collision between two freight trains.

On the morning of the 18th there was a butting collision between two freight trains on the Lake Shore & Michigan Southern road near Vermillion, O. Both engines and five cars were wrecked. The accident was caused by a mistake in orders.

On the morning of the 20th a freight train on the New York Central & Hudson River road ran over a misplaced switch, at Rhinecliff, N. Y., and met a freight train coming up on the opposite track. Both engines were wrecked and 12 cars were thrown into the Hudson River.

On the morning of the 21st, in a heavy fog, there was a butting collision between a repair train and a freight train on the Troy & Greenfield road in North Adams, Mass. The freight was backing up into the North Adams yard, while the repair train, which consisted of an engine and caboose, the caboose in front, was going out. The caboose was wrecked and driven into the engine, breaking the boiler in front so that the steam escaped, scalding the workmen in the caboose. One man was killed, eight fatally injured and 23 less severely hurt.

On the morning of the 23d there was a butting collision between a passenger train and a shifting engine, with a number of freight cars attached, in the New York, Lake Erie & Western yard, at Paterson, N. J. Both engines and two freight cars were damaged and the passenger conductor hurt.

On the morning of the 24th there was a butting collision between two freight trains on the Credit Valley road near Church Falls, Ont., wrecking both engines.

On the morning of the 30th there was a butting collision between a passenger and a freight train on the East Tennessee, Virginia & Georgia road, near Silver Creek, Ga. Both engines and six freight cars were badly broken, a fireman killed and an engineer hurt.

On the afternoon of the 24th there was a butting collision between a passenger and a freight train on the Missouri Pacific road on a trestle near Independence, Mo. Both engines and several cars on the trestle were wrecked and a fireman badly hurt.

On the evening of the 31st a passenger train on the New London Northern road and a freight train which was running into the yard in Palmer, Mass., came into collision, wrecking both engines and three cars.

CROSSING COLLISIONS.

On the afternoon of the 9th a Chesapeake, Ohio & Southwestern passenger train ran into a Chicago, St. Louis & New Orleans passenger train at the crossing in Fulton, Ky., wrecking two passenger cars. There is a dispute as to which engine had the right of way.

On the morning of the 14th a freight train on the Pittsburgh Cincinnati & St. Louis road, ran into an Indiana, Bloomington & Western freight at the crossing near Columbus, O., damaging several cars.

On the morning of the 20th a Cincinnati, Hamilton & Dayton freight train ran into a New Castle & Rushville freight at the crossing in Rushville, Ind., damaging the engine and two cars badly.

On the night of the 24th a passenger train on the Baltimore & Ohio road ran into a Cincinnati & Muskingum Valley freight at the crossing in Zanesville, O. The Baltimore & Ohio engine and a coal car were wrecked.

PASSING COLLISION.

On the morning of the 16th two passenger trains on the Philadelphia & Reading road met in the tunnel near Phoenixville, Pa., which is very narrow, the tracks being nearer together than at other points. The two baggage cars struck at the corners and were badly broken, and several other cars were damaged.

DERAILMENTS, BROKEN RAIL.

On the night of the 1st a passenger train on the Memphis & Charleston road struck a broken rail near Madison, Ala., and two cars were thrown from the track, injuring a trainman and three passengers.

On the morning of the 2d a passenger train on the Warren & Farnsworth Valley road struck a broken rail near Clarendon, Pa., and two passenger cars were thrown from the track and upset. Two passengers were hurt.

On the afternoon of the 14th a passenger train on the St. Johnsbury & Lake Champlain road struck a broken rail near Hardwick, Vt., and one car was thrown from the track. Three passengers were hurt.

On the morning of the 16th a rail broke under a passenger train on the Utah & Northern road near Collinson, Utah, and the sleeping car upset and was damaged.

On the morning of the 17th a car of a passenger train on the Indiana, Bloomington & Western road was thrown from the track near Sandusky, O., by a broken rail. The car was wrecked, the conductor and 10 passengers hurt.

On the evening of the 20th a passenger train on the Memphis & Little Rock road was thrown from the track by a broken rail near Hopfield, Ark., and the engine and one car were wrecked, injuring two trainmen.

On the morning of the 26th a passenger train on the St. Louis & San Francisco road struck a broken rail near Meramec, Mo., and two cars were thrown from the track. The sleeping car upset down a bank.

DERAILMENT, SPREADING OF RAILS.

On the morning of the 7th a local passenger train on the Pennsylvania Railroad was thrown from the track near Robberstown, Pa., by the spreading of the rails.

On the afternoon of the 9th the engine and one car of a freight train on the New York Central & Hudson River road were thrown from the track at Pittsford, N. Y., by the spreading of the rails.

On the morning of the 14th two cars of a passenger train on the St. Louis, Hannibal & Keokuk road were thrown from the track near Frankford, Mo., by the spreading of the rails. Three trainmen were hurt.

On the night of the 17th the engine and one car of a freight train on the New York & New England road were thrown from the track near Bolton, Conn., by the spreading of the rails.

On the morning of the 21st several cars of a freight train on the Ohio Southern road were thrown from the track near Greenfield, O., by the spreading of the rails. The cars were badly broken and the conductor killed.

On the night of the 24th the engine of a freight train on the Virginia Midland road was thrown from the track near Lucado, Va., by the spreading of the rails.

DERAILMENTS, BROKEN BRIDGE.

On the afternoon of the 18th a coal train on the Albany & Susquehanna road went through a bridge near Otsego, N. Y., and the engine and 15 cars went down into the Susquehanna River and were wrecked. The fireman was killed, the engineer and a brakeman hurt. It is said that the bridge was old and was soon to have been replaced.

On the morning of the 28th a passenger train on the Texas & St. Louis road broke through a small bridge near Malden, Mo. A passenger car went down and was wrecked and five passengers were hurt.

On the evening of the 28th a freight train on the New York & Canada road broke through a small trestle bridge near Putnam, N. Y. The engine went over, but 18 cars went down and were piled up in a bad wreck. Two trainmen were killed.

DERAILMENTS, BROKEN AXLE.

Early on the morning of the 3d several cars of a local

freight train on the Boston, Lowell & Concord line were thrown from the track near Wilmington, Mass., by a broken axle.

On the afternoon of the 7th six cars of a freight train on the Cincinnati, Wabash & Michigan were thrown from the track near Wabash, Ind., by a broken axle.

On the evening of the 27th a car of a coal train on the Philadelphia & Reading road broke an axle when near Zehner, Pa., and 37 cars were piled up in a bad wreck, blocking the road all night.

DERAILMENT, BROKEN WHEEL.

On the night of the 1st a car of a freight train on the Pennsylvania Railroad was thrown from the track in East Newark, N. J., by a broken wheel.

DERAILMENTS, WASH-OUTS AND LAND SLIDES.

On the morning of the 5th a construction train on the Chippewa Valley & Superior road ran into a wash-out near Caryville, Wis., and seven cars were wrecked.

On the afternoon of the 31st a passenger train on the Atlanta & Charlotte Air Line ran into a landslide near Gainsville, Ga. The engine and tender were thrown over, and the postal car ran upon the tender and was wrecked. Two postal clerks were badly injured, the engineer and fireman slightly hurt.

DERAILMENTS, ACCIDENTAL OBSTRUCTIONS.

On the morning of the 4th five cars of a freight train on the Troy & Boston road were thrown from the track near Eagle Bridge, N. Y., by a brake-beam which fell on the track.

On the morning of the 22d a piece of shafting fell from a flat car of a freight train on the New York, New Haven & Hartford road near Southport, Conn. It fell between the cars, so that the next following car was thrown from the track and seven other cars were piled up on top of it in a bad wreck. A brakeman was killed and two others hurt.

On the night of the 31st a passenger train on the New York, Lake Erie & Western ran into a pile of boards which had fallen or been blown from a car on a siding from Wells-ville, N. Y. The engine and several cars were thrown from the track and the engine upset. The engineer and fireman were badly injured, a brakeman and a passenger slightly hurt.

DERAILMENT, MAN ON TRACK.

Early on the morning of the 22d the engine of a freight train on the New York, Lake Erie & Western road ran over a man near Chester, N. Y., and was thrown from the track.

DERAILMENTS, CATTLE.

On the morning of the 2d a construction train on the Rio Grande & Pecos Valley road ran over a cow near Laredo, Tex., and five cars were thrown from the track.

On the morning of the 2d a passenger train on the Mont Alto road ran over a cow near Chambersburg, Pa., and one car was thrown from the track and upset, injuring nine passengers, four of them seriously.

On the morning of the 4th a passenger train on the Midland North Carolina road ran over a cow near Smithfield, N. C., throwing several cars from the track and injuring a brakeman.

On the morning of the 5th a freight train on the Chesapeake & Ohio road ran into some cattle near Hinton, W. Va., and the engine and several cars were thrown from the track and down a bank. The engineer and firemen were killed.

On the morning of the 7th a freight train on the Chicago, St. Louis & New Orleans road ran over a mule near Crystal Springs, La., and 14 cars were piled up in a bad wreck. A brakeman was killed.

On the evening of the 9th a passenger train on the Indianapolis & St. Louis road ran over a cow near Pana, Ill., and the engine and baggage car were thrown from the track and down a bank. The fireman was caught under the engine and killed.

On the evening of the 9th a passenger train on the Louisville & Nashville road ran into a lot of cattle near Ashley, Ill., and the whole train was thrown from the track. The engine upset, killing the fireman; eight passengers were also hurt.

On the night of the 9th a passenger train on the Texas & Pacific road ran over a cow near Sweetwater, Tex., and the engine was thrown from the track and went down the bank into a creek. A brakeman was killed and the fireman hurt.

On the afternoon of the 12th a construction train on the Denver & South Park road ran over a cow near Mosquito, Col., and was thrown from the track and down a high bank. The conductor and two laborers were killed.

On the morning of the 20th a passenger train on the Missouri Pacific road ran over a cow near Proctor, Mo., and the whole train was thrown from the track. A brakeman was killed.

On the morning of the 21st a freight train on the Louisville & Nashville road ran over some cattle near Shepherds-ville, Ky. The whole train was thrown from the track and the engine upset, killing the engineer and a brakeman.

Very early on the morning of the 30th a passenger train on the Wilmington & Weldon road ran over a cow near Goldsboro, N. C., and the engine and two cars were thrown from the track.

DERAILMENTS, MISPLACED SWITCH.

On the morning of the 7th a freight train on the Missouri, Kansas & Texas road was thrown from the track at Muskogee, Ind. Ter., by a misplaced switch. The engine upset, killing the engineer and fatally injuring the fireman.

On the afternoon of the 7th a car broke loose from a freight train on the New York, Lake Erie & Western road at Otisville, N. Y., and started off down grade at a high speed, but was thrown from the track by an open switch.

On the afternoon of the 9th a passenger train on the New York & New England road was thrown from the track in Springfield, Mass., by a misplaced switch.

On the afternoon of the 19th a freight train on the Tawas & Bay City road was thrown from the track near Tawas, Mich., by a misplaced switch.

On the morning of the 20th a coal train on the Missouri Pacific road was thrown from the track in Rich Hill, Mo., by a misplaced switch, and the engine and two cars were wrecked.

On the morning of the 22d the engine and two cars of a passenger train on the New Orleans Pacific road were thrown from the track near Rapides, La., by a misplaced switch.

MALICIOUS DERAILMENTS.

On the evening of the 19th a freight train on the Charlotte, Columbia & Augusta road struck some ties piled upon the track near Columbia, S. C., and the engine and five cars were thrown into the ditch. A brakeman was killed.

On the morning of the 26th a passenger train on the Detroit, Grand Haven & Milwaukee road was thrown from the track near Berlin, Mich., where two rails had been removed by persons unknown. The engine and two cars went down a bank.

On the afternoon of the 26th a freight train on the Kentucky Central road was thrown from the track near Maysville, Ky., by some obstructions placed on the track. The engine and two cars were wrecked.

On the afternoon of the 28th the engine of a passenger

train on the Troy & Boston road was thrown from the track near Schaghticoke, N. Y., by some ties piled up on the track.

On the night of the 28th the engine and one car of a passenger train on the Louisville, Evansville & St. Louis road were thrown from the track near New Boston, Ind., by a switch which had been purposely misplaced, the lock having been broken with a hammer. The engine upset and the fireman was caught under it and killed.

UNEXPLAINED DERAILMENTS.

On the afternoon of the 1st a pusher engine which was helping a freight train on the Missouri Pacific road over a grade at St. Paul, Mo., ran off the track and upset. The engine was badly broken.

At noon on the 2d the engine of a sand train on the Texas-Mexican road ran off the track in Galveston, Tex., and the engine upset, killing the engineer. It is said that he was running around a sharp curve at high speed.

On the morning of the 3d several cars of a freight train on the Texas & Pacific road ran off the track near Handley, Tex., blocking the road all day.

On the morning of the 3d a car of a Memphis & Charleston passenger train ran off the track in Chattanooga, Tenn. Two trainmen were slightly hurt.

On the night of the 3d a car of a freight train on the Missouri, Kansas & Texas road ran off the track in the yard at Ft. Worth, Tex., and was damaged.

On the evening of the 4th some cars of a coal train on the Philadelphia & Reading road ran off the track near Mine Run Junction, Pa., wrecking the cars and damaging a bridge near by.

On the morning of the 7th a passenger train on the Allegheny Central road ran off the track near Angelica, N. Y., damaging two cars.

On the night of the 7th several cars of a freight train on the New York, Lake Erie & Western road ran off the track in the yard at Port Jervis, N. Y., smashing a switchman's house.

About noon on the 8th several cars of a freight train on the Boston & Albany road ran off the track near Middlefield, Mass., blocking the road six hours.

On the morning of the 9th several cars of a freight train on the New York, Lake Erie & Western road ran off the track near Secaucus, N. J., blocking the road a short time.

On the afternoon of the 10th a car of a freight train on the Missouri, Kansas & Texas road ran off the track near Ft. Worth, Tex., and was damaged.

On the evening of the 10th the engine and four cars of a ballast train on the New York Central & Hudson River road ran off the track near Rochester, N. Y., causing some delay.

On the night of the 10th four cars of a freight train on the Rochester & Pittsburgh road ran off the track near Ellicottville, N. Y., damaging a bridge.

On the morning of the 14th a shifting engine on the Oregon and California road pushed two cars off the track in the yard in Portland, Or., wrecking them both.

On the morning of the 16th a car of a freight train on the Connecticut River road ran off the track at Holyoke, Mass., causing some delay to trains.

On the morning of the 16th three cars of a freight train on the Texas Pacific road ran off the track near Marshall, Tex., and two of them upset and were damaged. The accident was caused by a broken rail.

On the morning of the 17th several cars of a freight train on the Pennsylvania Railroad ran off the track in East Newark, N. J., blocking two tracks an hour.

On the night of the 17th several cars of a coal train on the New York Central & Hudson River road ran off the track near Crittenden, N. Y., and were piled up in a bad wreck.

Near midnight on the 22d the cars of a freight train on the Pennsylvania Railroad ran off the track near Torresdale, Pa., blocking the road several hours. A brakeman was hurt.

On the morning of the 23d a freight train on the Louisville & Nashville road ran off the track near Montgomery, Ala., blocking the road several hours.

On the afternoon of the 25th several cars of a freight train on the New York Central & Hudson River road ran off the track in Rochester, N. Y., doing a little damage.

On the night of the 25th a car of a freight train on the New York Central & Hudson River road ran off the track near Lyons, N. Y., doing some damage.

On the night of the 26th the engine of a passenger train on the Milwaukee, Lake Shore & Western road ran off the track in Wausau, Wis., injuring the fireman.

On the night of the 27th a freight train on the Buffalo, New York & Philadelphia road ran off the track near York-shire Centre, N. Y., and 13 cars went into the ditch.

On the afternoon of the 31st the engine of a freight train on the New York Central & Hudson River road ran off the track in Rochester, N. Y., doing a little damage.

OTHER ACCIDENTS.

On the afternoon of the 27th the engine of a passenger train on the Rochester & Pittsburgh road broke the tire of one of the driving-wheels when near Bliss, N. Y. The flying pieces damaged the engine considerably.

On the morning of the 28th the engine of a passenger train on the Concord road broke a parallel rod when near Concord, N. H., and the strain thrown on the other rod caused it to break immediately afterwards. The cab and engine were badly damaged and the engineer slightly hurt.

On the afternoon of the 28th the engine of a passenger train on the Manhattan Elevated road broke a driving axle when near the Battery station in New York, but did not leave the track.

On the afternoon of the 30th the engine of a passenger train on the Wabash, St. Louis & Pacific road broke an eccentric rod when near Bennett, Ind. The loose end of the rod tore a hole in the boiler, allowing the steam to escape.

SUMMARY.

This is a total of 136 accidents, in which 47 persons were killed and 132 injured; a daily average of $4\frac{1}{2}$ accidents, $1\frac{1}{2}$ killed and 4 injured.

Forty-five of the killed and 86 of the injured were railroad employes; 2 of the killed and 46 of the injured were passengers or others riding in the cars.

Of the whole numbers of casualties 131, or 73.2 per cent., were to employes, and 48, or 26.8 per cent., to passengers.

For the ten months of 1882 there have been reported 1,091 accidents, in which 315 persons were killed and 1,250 injured; a monthly average of 109 accidents, $31\frac{1}{2}$ killed and 125 injured.

Wrecking a Station.

As train No. 12, going east on the Rochester & Pittsburgh road passed Bliss station, Saturday forenoon, the stakes on a flat car loaded with lumber gave way, and two large sticks of timber shot from the car into the frame building; one of them tore its way through waiting room, office, and into the freight department. The second stick knocked the foundation from under the building. No one was hurt, for fortunately there was no one in the office at the time.—*Rochester (N. Y.) Democrat*, Nov. 28.

Contributions.

Speed of English Trains.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The average rate of speed of the fastest English express trains, including stoppages, is as follows:

Railway.	Distance in miles.	Time occupied h. m.	Average rate of speed per hour.
Great Western... London to Swindon.	193	4.15	53½
Great Western... London to Exeter.	188	4.15	46
Great Northern... London to Peterboro.	76	1.30	51
Great Northern... London (Willesden) to Northampton.	188	3.55	48
Midland... London to Kettering.	60	1.10	51
Northeastern... Newcastle to York.	70½	1.25	59
London & South-western... London to Basingstoke.	80½	1.38	49
London & South-western... London to Exeter.	48	1.3	45½

It will be seen that the quickest train is that of the Great Western Company, which is known as the "Flying Dutchman." It must be remembered, however, that this is on the broad gauge (7 ft.) and has heavier engines and rolling stock than the other companies with a gauge of 4 ft. 8½ in.

During the summer of 1880 the distance of 105 miles between London and Grantham, Great Northern Railway, was done daily in 123 minutes, or an average of 51 miles per hour, and by special train the same ground has been covered in 111 minutes, or an average of 66½ miles per hour.

C. E.

The Speed of Fast Trains in Europe and America.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice some inaccuracies in the article under this head in your issue of Nov. 17.

Referring first to the tables of foreign speeds given it appears that the mileage in several cases is incorrect, thereby altering the speed considerably. Data obtained a few years ago show the express from Paris to Bordeaux, 359 miles in 9 hours 10 minutes (over 39 miles per hour) to be the fastest train in France, and the express from Berlin to Hanover, 158½ miles in 3 hours 48 minutes (over 41 miles per hour), to be the fastest train in Germany. These speeds are hardly equaled in America by any trains running the same distance.

The distance between London and Liverpool is not from 225 to 250 miles as you suppose, but is only 202 miles via the London & Northwestern Railway and the fastest trains take 5 hours, a little faster than the fastest trains between New York and Boston. The quickest time between the last two cities is made by the Springfield trains running north, which makes the run of 234 miles in 6 hours 3 minutes, or at the rate of nearly 39 miles per hour. The corresponding train south requires 6 hours 12 minutes, taking into account the difference of time between the two cities. Allowing for this, I find the Shore Line requires 6 hours 7 minutes to make its run of 229 miles from Boston to New York.

The distance from Jersey City to Washington via the Pennsylvania Railroad, is nearer 226 than 244 miles as given. I would also take exception to your statement that the fastest American speeds given (47½ miles per hour, Jersey City to Philadelphia) for a run of 50 or 100 miles, is not exceeded in England. The "Flying Dutchman" on the Great Western Railway runs from London to Swindon, 77½ miles, in 1 hour 27 minutes, or 53.3 miles an hour. This train used to be the fastest in the world, but the speed is fully equaled by some of the Leeds expresses on the Great Northern, which run 70½ miles in 1 hour 17 minutes without stoppage, or at the rate of 54.7 miles an hour.

A. L. ROTCH, Mass. Inst. of Technology.

BOSTON, Nov. 29, 1882.

The Car Coupling Problem.

SHARPSVILLE, MERCER COUNTY, Pa., Nov. 27, 1882.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just read in the *Gazette* of Nov. 24, your remarks under the title "Automatic Freight Car Couplers."

Referring to the diversity existing in the form and proportions of "dead-blocks," and other attachments used on the ends of cars, you say: "These vary in kind, size and form, so that there is great difficulties in getting a coupler which will work satisfactorily with one kind of car to operate with equal success with another. In fact, inventors of couplers are now obliged to attempt a solution of a problem in which there is one undetermined element which almost invariably defeats or nullifies their efforts. It seems then as though the solution of the question must come * * * not by making a self-coupler which will suit existing cars, but by making cars which will suit some kind of coupler."

This is only arguing that all freight cars should be made uniform as to height of centre of draw-bar above the rail, and as to style of end attachments, including draw-head and coupler, and that until this is done many, if not all, of the evils arising out of the existing diversities in height and form of couplers must continue.

I believe that all railroad men agree that a very desirable condition would be effected were the draw bars of all freight cars placed at one certain height above the rail; and that this condition would be bettered were couplers made universally of some one approved pattern, and "automatic" in motion, but can you find any railroad man who believes that either of these conditions will be effected?

Even were there a prospect that at some time in the future

a sufficiently close approach to uniformity in the apparatus named might be reached, we should nevertheless have to deal, for the present and for a long time to come, with the cars now in use, and the fact is patent to any observer that in these cars the varieties in style and arrangement of end-fittings are, practically, endless.

Except on some coal roads using their own cars almost or quite exclusively, one seldom or never sees a train containing as many as twenty freight-cars in which the draw-bars and couplers are of uniform height and pattern. The lack of uniformity in height of draw-bar is the element that more than any other defeats the inventor who would devise an automatic freight-car coupler.

Many of those who have taken out patents for couplers have prepared their devices without regard to the existing differences in height of draw-head. An examination of the drawings and models of the patent office clearly indicates this fact, as it will also the fact that some of them have devised "draw-heads" and "couplers" without having troubled themselves to examine a freight-car at all.

Separations of freight-trains while in motion, which mis-haps result in damage that in the aggregate is immense, are largely attributable to those diversities in height of draw-head which render necessary the use of "crooked links," and one would think that a consideration of this fact alone, apart from any solicitation for the safety of employes, would lead railroad managers to insist upon having draw-heads placed at the "standard" height.

But the fact is, that while master car-builders are, as a rule, anxious to conform to the standard, instances are not wanting in which a manager has made a contract for a lot of cars without consultation with his car-builder, whose first intimation of the transaction has been received in the shape of an order to send a man to inspect the lot of finished cars; and these cars, as might have been expected, have been found to have hardly one part exactly like a corresponding part in any of the cars for use with which they have been built.

As long as this method of procedure is continued, master car-builders can accomplish but little in the direction of establishing uniformity. Who knows how long this, and other like practice will obtain? There seems to be but faint indication of any immediate joint action of railroad companies looking to the establishment of uniformity in rolling stock, and as long as there is no such joint action objectionable diversities in rolling stock will exist.

But the existing diversities in draw-heads and coupling apparatus, while they are objectionable, and indeed exceedingly objectionable, are not such as to render impossible the devising of apparatus for coupling differing cars that will act automatically, and as infallibly as any merely mechanical contrivance acts; and as this is, demonstrably, a fact, I do not subscribe to your conclusion that we cannot remedy the existing evil, and cannot even sensibly mitigate it, except through the process that you suggest, which involves the devising of a coupler that under given conditions will automatically couple cars, and, thereafter, making all cars to suit that coupler.

The existing evil is mainly this: that in coupling freight cars, made as those now in use are, the brakeman, or other employe unfortunate enough to have that work to do, risks his life at every performance of the operation. Every year, scores of men while engaged in that operation lose their lives, and every year hundreds are maimed or seriously injured. And this condition will continue, even if we eventually make all freight cars exactly alike as long as we persist in the use of the ordinary "link and pin" coupler.

Extreme caution might save a man from injury through several years of service as coupler of cars of the existing style; but brakemen are not cautious. The young man who prides himself upon his ability to run at speed along the four-inch rails of a string of "hopper" cars while the train is rattling along the track, and to rush at the celebrated "leppers" own gait, along "gondolas" piled high with blocks of ice-covered coal while the cars are rushing, at midnight, through a whirling snow-storm, has not as a rule the bump of caution largely developed. If there be obvious danger in running along a slippery track in advance of a backing train, and in steering a brake into a draw-head as the train crashes into a standing car, this young man rather glories in braving that danger.

I have before me the "Blue-book" of a railroad company, wherein I find these statements:

"Every employe is permitted and enjoined to take sufficient time and to use the means necessary for examining all cars or engines on which he is to ride or to operate, and all * * * attachments to trains with or about which he is to work, so as to know for himself, as well as this company or its managing officers can know, their safety and suitability. He will vigilantly look out for his own safety, especially in the switching of cars and in all movements of trains. He is warned not to get between cars in motion, and not to jump on or off trains in motion."

I happen to know that the gentleman who prepared these orders and suggestions, heartily wished to benefit the employes under his direction, and intended the rules for the good of those employes. Of course, in giving his warning, he had in mind the question of the responsibility of the company in case of injury to an employe; but the rules were made "in good faith" for all that.

Imagine a brakeman's commentary on these rules: "A sweet brakeman he would be who couldn't get between the cars in motion, and wouldn't jump off or on trains in motion, and who was always vigilantly looking out for his own safety. That won't work!"

They will not, cannot, vigilantly look out for their own safety, except as they do that in effect while vigilantly looking out for the safety of their trains.

As long as freight cars are made so that any ordinary

mortal would be smashed or maimed in attempting to couple two of them, so long will even the agile and ready brakeman now and again get smashed.

As the existing state of things, in this regard, is a crying shame, and as a reform in the matter is absolutely demanded, don't discourage the inventors nor the master car-builders who, from whatever motive, seek to put into use improved couplers!

Even if we cannot effect all that seems desirable, we can much improve the situation.

Of the more than two thousand couplers for which patents have been granted in this country, there are several, any one of which would entirely satisfy all the requirements of the case in question were all draw-bars fitted with it and all set at one height above the rail; but I do not know of a coupler that would automatically make proper connection with another differing in form and set considerably lower or higher than itself.

We shall have a great improvement on the ordinary man-trap if we get a coupler that will automatically couple with another of its own kind, let that other be at the same height with itself or not, and that may be readily connected with another of any of the link and pin arrangements, high or low.

I have seen such a coupler. It is perfectly simple in form and the casting is all in one piece.

It has, besides the capabilities above named, the further desirable quality of permanently holding on to the link and pin used with it.

Links and pins lost and stolen cost our railroads an enormous sum yearly. For the service of 1873 links and pins cost the Lake Shore road \$52,491.

This coupler is made so that it may be attached to any wrought-iron draw-bar in use, and projects, when no strain is on the draw-bar spring, no further beyond the transom of the car than the most "stubbed" cast-iron draw-head.

It has no parts requiring nice adjustment and none that anything short of a general smash up can break.

A train of cars fitted with it may be coupled or uncoupled while standing crowded together.

It costs but a trifle more than an ordinary heavy cast-iron draw-head with link and pin added. The proposition, of which you speak, for the organization of a joint stock company for the purpose of investigating the whole coupler question, and introducing the apparatus needed, seems a good one. A company organized and operating in accordance with the programme outlined in the editorial, the title of which has been hereinbefore given, could hardly fail to make very material progress toward the end originally aimed at, even if it could not attain that end precisely, and would reach the practical limit of improvement in the field in question very much more directly, and much sooner, than the railroad companies of the country will, or can, reach it.

The company will need for use in experiments with couplers a piece of railroad presenting examples of unmitigated abruptness in "change of grade," summits and "swamps" with steep gradients approaching the same from either side; extreme sharpness of curvature, with reverses in that curvature, and some very abrupt turnouts; and pieces of track with very "high" joints and very "low" joints, and lateral inequalities such as make cars "swing" violently.

It should employ, for making certain tests, a locomotive driver hardened in the experience of running a way-freight train—one who has had long runs to make, with a short-handed train-crew, on a half built road, in a region where there is plenty of snow in its season, and on scant wages, would be likely to fill the bill for the case in view; and with him one or two well-seasoned brakemen.

Let the engineer be of a temperament rendering him naturally irascible and impatient.

Let the cars be of all sorts of heights (and of immense strength), and have the brakes arranged variously, so that one will set as tight as a drum while another won't hold at all.

With this equipment, operated under judicious superintendence, a coupler may be made to reveal weak points, that, under conditions prepared to favor it, would not appear.

J. M. GOODWIN.

National Exposition of Railway Appliances.

The following circular is dated from the office of the commissioners, at the Grand Pacific Hotel, Chicago, Dec. 4, 1882:

Almost a year ago, the feasibility of organizing and conducting a National Exposition of Railway Appliances at some favorable point in the United States and in the near future began to be discussed by prominent parties deeply interested in the growth and prosperity of this interest. A very thorough expression of the sentiment of railway men and inventors and manufacturers of and dealers in railway appliances has during this period been obtained, the universal tone of which has been enthusiastically in favor of the proposition.

Accepting this as a safe indication that an exposition can be organized which will reflect credit upon and result in great good to the railway and manufacturing interests of this country and of the world, and believing that the magnitude of these interests and their wonderful growth in the past few years make the present a most auspicious time in which to accomplish this, a board of commissioners, whose names are attached to this circular, has been organized to arrange for and conduct such an exposition.

The Inter-State Exposition buildings, located near the business centre of the city of Chicago, on the shore of Lake Michigan, and convenient to the depots of the various railways, have been secured. These are the largest exposition buildings in this country, and are especially adapted to the purpose in question. The main building is 800 ft. long and 200 wide, has a capacious gallery one-third of a mile in length, and is provided with an abundance of steam power for operating machinery. Railway tracks will be laid the entire length of this building for the accommodation of cars and locomotives and for use in making tests, which will be

connected with the tracks of the Baltimore & Ohio, Illinois Central and Michigan Central roads, running within a few feet of its eastern wall.

Most favorable rates will be given by the railways of the country for the transportation of articles intended for exhibition and excursion parties desiring to attend.

A series of scientific and practical tests, to be made by well-known scientists and carefully selected committees, extending to every article and every description of material susceptible of reliable test, will constitute one of the most interesting as well as most valuable features of the Exposition. An official record of these tests and of every exhibit, including a list of prizes awarded, will be made and published under direction of the commissioners.

Exhibitors will be required to pay a reasonable fee for themselves and for employees in charge of exhibits, and an extra sum for each class in which they may desire to compete for a prize (the amounts to be hereafter fixed), to defray the expenses of conducting tests and examinations and of providing medals.

Every dollar of the proceeds of the exposition, after defraying necessary expenses, will be devoted to benevolent purposes connected with the railway service, to be hereafter designated by the commissioners.

A large guarantee fund has been raised in Chicago, sufficient to insure beyond peradventure the financial stability of the exposition.

No officer or commissioner will receive any salary or compensation for his services as such, the good of the great interests named and of the army of employees connected with them being the only incentive to the labor which he shall perform.

The exposition will open on or about Thursday, May 31, and close on or about July 7, 1883, and the time for preparation being thus limited, it is important that all who intend making exhibits shall begin necessary preparations at once.

It is requested that each person or firm receiving this circular (No. 1) will, at the earliest possible moment, indicate as nearly as may be, his or their intentions with reference to being represented at this Exposition, the probable extent and character of the exhibit, the least amount of space that could be used to properly present it, and the greatest amount that could be advantageously used provided it could be had. As soon as these replies have been received, a diagram of the Exposition buildings, showing amount and character of space to be assigned will be sent to all parties desiring to exhibit, together with necessary blanks on which to make application.

An admission fee will be charged visitors, thus relieving exhibitors of the necessity of providing for the expenses of the Exposition.

It is believed that an exhibit can be organized which, in its benefits to the more intelligent masses, and especially to officers and employees in the railway service, and all who are interested in the manufacture of railway appliances, and as a contribution to the world's store of technical and practical knowledge, has never been equalled.

To this end it is earnestly hoped that every one who is directly or indirectly interested in supplying railroads, either with material or manufactured articles, will interest himself in this matter, and that every deserving article properly coming under the head of railway appliances may be creditably represented at this Exposition.

All correspondence should be addressed to the Secretary.

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The Positions of Presidents Porter and Mitchell with Regard to the Railroad War.

The Chicago Tribune reports the following statements to have been made by Mr. H. H. Porter, President of the Chicago, St. Paul, Minneapolis & Omaha Company, and by Mr. Alexander Mitchell, President of the Chicago, Milwaukee & St. Paul.

PRESIDENT PORTER'S POSITION.

Mr. Porter is reported as saying the day before the Chicago conference:

The war had not been brought about by the refusal of the Milwaukee & St. Paul to allow the Rock Island one-third of the Minneapolis business. The inauguration of the St. Paul war was the simple result of the reckless policy pursued by the Milwaukee & St. Paul in building railroads everywhere and in competition with everybody. As far as he was concerned, Mr. Porter said, this war would not come to a close until the Milwaukee & St. Paul would agree to stop

the reckless and destructive policy it has been pursuing during the last three years. He would not consent to become a party to an agreement to stop the present war until the Milwaukee & St. Paul agreed to no longer invade the territory of other lines. Of course he would not object to the Milwaukee & St. Paul building or acquiring new lines wherever and whenever it pleased, if such was done legitimately and in accordance with the demands of business. But the new roads the Milwaukee & St. Paul has built in the Northwestern territory were not legitimate enterprises. They were simply gotten up to destroy the business of other roads and ruin their prospects. The Omaha people had invested their money in building lines through a sparsely settled territory. They had labored hard to build up that territory in order to make some money on their investments. But no sooner had they succeeded in building up a place or a certain territory than the Milwaukee & St. Paul came there with a competing line.

The policy the Milwaukee & St. Paul has pursued not only towards the Omaha line but also toward the Rock Island and the Northwestern. The Rock Island was compelled to extend its line to St. Paul simply on account of the encroachments made into its territory by the Milwaukee & St. Paul. He could not see why the Chicago & Northwestern people should side or sympathize with the Milwaukee & St. Paul in this contest, as their road had certainly been as much a sufferer from the aggressions of the Milwaukee & St. Paul as the Omaha line or the Chicago, Rock Island & Pacific. The energy with which the Milwaukee & St. Paul has prosecuted its building schemes is illustrated by the fact that within the last five years it has extended its system from 1,500 miles to 4,500 miles. In doing this it has heavily bonded its road. Up to this time its passenger and traffic receipts had not been sufficient to warrant any such outlay of money and energy. It had long been the opinion of Eastern railroad men that the building of railroads, even in such a productive and growing country as the Northwest, was being greatly overdone, and that a halt would have to be made in time to enable that region to catch up in point of growth with the railroads.

The policy pursued by the managers of the Milwaukee & St. Paul has not been in the interest of the stockholders of their company, but simply to advance their own personal interests. A majority of the new lines acquired by the Milwaukee & St. Paul were built by officers and directors of the Milwaukee & St. Paul, and they afterwards sold these lines to the company at a largely increased price over what it took to build them. The Chippewa Valley & Superior road was an instance of this kind of work. This road was built by a syndicate, or rather construction company, with Mr. J. C. Easton, one of the directors of the Milwaukee & St. Paul, at the head. The newly organized Chicago & Evans-ton was another instance of this kind. This road is also being built by a syndicate of Milwaukee & St. Paul officials, with Mr. Easton as President, as an independent line, only to be ultimately sold to the Milwaukee & St. Paul Company at an exorbitant price.

A road by pursuing such policy as that had never yet prospered, and the Reading and Jersey Central were examples of this kind. Nothing could be gained by building railroads into territory where they were not needed. The people gained nothing by it. Two roads at a point where there is hardly business enough for one would soon find that they cannot live by reckless competition and cutting of rates, and consequently they would pool their business and make the rates high enough to pay a profit on their investments. One road at such point would have sufficient business to enable it to make fair and reasonable rates, and in order to keep out competition and to build up that part of the country it could not do otherwise than make reasonable rates.

The position he (Mr. Porter) is taking now is not of recent origin, as has been charged. He had held the same opinion for some years past. In order to show that he felt convinced, two years ago, that if the Milwaukee & St. Paul should not recede from the reckless policy it was pursuing, war would ultimately result, he produced the letter written by him to Vice-President Brewster, of his road, under date of Feb. 19, 1881, nearly two years ago.

[Published in the Railroad Gazette last week.]

Although, Mr. Porter continued, the Milwaukee & St. Paul had since that time kept up its policy of extending its line everywhere into the territory of his road wherever there was a chance to strike it badly, yet he had refrained from breaking the amicable relations with the Milwaukee & St. Paul until the present time, always hoping that better counsels would yet prevail with the Milwaukee and St. Paul people, but instead of that they became bolder and more reckless from day to day, until the Omaha Line was at last compelled to draw out of the St. Paul pool and fight for its existence.

The Omaha Line, he said, was not incumbered with a heavy debt like the Milwaukee & St. Paul, but is in an excellent condition to fight, having a sufficiently large surplus on hand to meet its obligations for the next three years. The Omaha Line would therefore be able to stand the fight so long, and he doubted whether the Milwaukee & St. Paul would be able to stand it one-third of that time. Mr. Porter also stated that he was fully determined to keep up this fight until some arrangement could be made regarding the territorial complications. He would attend Saturday's conference, but would not submit to any agreement to stop the cutting of rates until the territorial question be settled. He did not care how it was settled—by arbitration or otherwise—so long as it was settled in a manner that would prevent the reckless building of roads into the territory of existing lines. Not before that question was satisfactorily settled would there be peace between the Northwestern lines. There was no use in patching up a peace without having that problem solved for once and all, and this was as good a time to fight it out as any other.

After the conference last Saturday, the Chicago Tribune reports Mr. Porter as saying:

The Milwaukee & St. Paul had been pursuing its aggressive policy for the last three years, and it has become simply a matter of life and death for his road whether this state of affairs should be allowed to continue any longer. What he wanted now was that the Northwestern railroads should agree with each other what territory each will take, and protect each other by furnishing all facilities in a most liberal manner to the public along their respective lines, and that they should make a fair division of business and receipts at junction points. What he meant by protecting the public in a most liberal manner was that if a man wants to ship property at a local point on another road he should not be compelled to ship his business over a long circuitous route in order to give that line the long haul. This is done by charging a high local rate to the nearest junction point, and thereby the business is forced to a place where the road controlling the local points where the freight is destined will get it. Each road should be allowed to build such roads in that territory as business requires, and such rates should be agreed upon as were reasonable and fair. In this case that territory would have all the facilities it would have if it had more railroads. And, as in such case less capital needs to be invested, the work could be done cheaper and still a fair profit made. If the railroads in a certain territory do not

do well that section itself suffers, as it can't pay for labor, etc.

PRESIDENT MITCHELL'S POSITION.

The same journal reports the following from Mr. Mitchell:

Mr. Mitchell said that he simply claimed the right to extend the Milwaukee & St. Paul into any territory he chooses. His company, he said, was not responsible for the war, and was anxious to bring it to an end, but it could not consistently bind its hands at the dictation of rival companies, who were only actuated by jealousy towards the Milwaukee & St. Paul, and stop extending its lines into territory where the people wanted such lines to be built. To make an arrangement as Mr. Porter demands would create monopolies and result in such serious legislation as to cripple the railroad interests. His road had no desire to encroach upon anybody else's rights, but was acting simply in the interest of its stockholders and the public.

The Weight and Number of Parts of a Locomotive and Tender in Detail.

We give, herewith, the weight of all the parts of a locomotive and tender, which were ascertained by carefully weighing each part when finished and ready to put on the engine. The number of pieces were counted and includes all excepting the nails in the wood work, and the pieces of wood in the lagging. The locomotives were built in 1865 for the Illinois Central Railroad Company by the Hinkley Locomotive Works of Boston, and were copies of locomotives built at the Rogers' Locomotive Works some years before that date. They were light engines compared with the practice of the present day. They were of the American type with 5 ft. driving-wheels and 15 x 22-in. cylinders. The fire-boxes or grates were 4½ ft. long, and the boilers had 165 tubes, 1½ in. in diameter.

The weights of the brass parts, those of wrought-iron and steel, and those of cast-iron and also wood, etc., are given in separate columns. The number of parts was counted merely as a matter of curiosity. If some one would get the weight in detail of a standard engine of the present day in a similar way, it would be an extremely useful piece of work:

Number and Material of Parts of a Locomotive and Tender in Detail.			
	Brass	Wro't Iron	Cast Wood No.
	lbs.	lbs.	etc., of
BOILER:			
Boiler, sheets, rivets and stay-bolts.....	6,250		
Boiler-braces, crown-bars and stay-bolts.....	1,635		1,610
Tubes and copper thimbles.....	3,034		128
1 brass ring for dry-pipe, riveted to tube, 16 rivets for same.....	40	8	17
20 studs and nuts for same.....			1
5 hand-hoe plates, 5 holders, 5 bolts, nuts and washers, 5 pieces of rubber	15	17	25
1 furnace-door, hinges and chain.....	67		20
DOMES, ETC.:			
1 cast-iron dome.....		419	1
20 studs and nuts for same.....		15	40
1 top for front dome.....		171	1
14 studs and nuts for same.....		7	28
1 set brass ornaments for back dome.....	39½		1
1 set brass ornaments for front dome.....	39½		1
1 dome-base for back dome.....		112	1
1 dome-base for front dome.....		143	1
SAFETY-VALVES, ETC.:			
2 safety-valves.....	3		2
2 safety-valve seats.....	10		2
2 safety-valve levers and 4 fulcrums, 4 pins and 2 keys.....	18		14
2 spring balances and 2 set-screws.....	7½	8	32
2 cast-iron bushings in roof of cab.....		7	2
1 whistle.....	23		9
DRY PIPES:			
2 copper receiving pipes.....			12
2 wrought-iron rings for same.....		52	2
1 casting for back end of dry-pipe.....		0	1
1 wrought-iron ring for same.....		27	1
2 brass saddles.....		11	2
1 joint-ring at smoke-box.....			1
THROTTLE-VALVES, ETC.:			
Throttle-valve box and cover.....			193
3 studs and nuts and 8 bolts and nuts for do.....		18	32
1 brass stuffing-box for do.....		7½	1
1 brass gland for do.....		5½	1
2 bolts and 4 nuts for do.....		2	6
1 throttle-lever, back end of stem, screw and nut, 3 pins and keys, 2 links, 1 fulcrum.....		21	13
1 throttle-stem.....		69	1
STEAM AND EXHAUST PIPES:			
2 steam-pipes.....		254	2
4 bolts and nuts for same.....		6	8
4 brass joint-rings for same.....		9½	4
2 exhaust-pipes.....		116	2
4 bolts and nuts, 2 sets screw for do.....		5	10
2 nozzles.....		7	2
PETTICOAT-PIPE, ETC.:			
1 Petticoat-pipe, 6 pieces, 3 braces.....		38	9
3 hangers, 6 bolts and nuts for same.....		14	15
BLOWER:			
1 blower-valve.....	16		3
1 stem and fulcrum, 3 nuts, 1 lever.....		6	3
1 rod, 1 guide, 1 handle.....		22	4
1 pipe.....		19	1
SMOKE-BOX DOOR, ETC.:			
Smoke-box door, 2 pieces.....		228	2
20 studs and nuts for same.....		11	58
Smoke-box door.....		108	1
2 handles, 2 nuts, 2 pins and keys for hinges, 2 clips, number plate, 3 studs and nuts.....		34	17
1 brass ring for number-plate.....		9	1
SMOKE-STACK:			
Main pipe of smoke-stack, 11 pieces iron, 1 piece half-round iron, 5 bolts and nuts, 3 braces.....		325	25
Inside-pipe, 6 pieces iron, 3 rods, 6 nuts, 15 bolts and nuts, 3 brackets, bolts and nuts.....		117	54
1 deflector, 1 spark-spout and cover.....		128	3
1 base for smoke-stack.....		10	11
6 bolts and nuts for same.....			
GRATES, ASH-PAN, ETC.:			
6 grate-bars.....		504	6
2 side-plates.....		33	2
1 drop-door.....		175	1
2 rock-shafts.....		173	2
6 pins and keys, 1 pin and nuts.....		5	14
4 bearings for rock-shafts.....		10	8
4 bolts for same.....		41	4
2 bearings and bolts for side-plates.....		86	1
1 bearing-bar for drop-door.....			4
4 bolts for same.....		37	1
1 bar for shaking grate.....			
1 lever for shaking grate, 2 bolts and nuts, and 2 pins and keys.....		32	9
1 fulcrum for shaking grate.....		24	1
1 handle for shaking grate.....		22	1
1 shaft for drop-door.....		54	1
1 lever for drop-door, handle and key.....		18	3
1 spring for drop-door, 1 bolt and nut.....		3	3
1 ash-pan, 4 sheets, 5 pieces angle iron, 2 doors, 4 slides, 2 handles.....		180	17
1 back door, hinges, 4 pieces.....		21	5
2 straps for ash-pan, 4 bolts and nuts.....		38	9
BOILER BRACES:			
2 braces from hanger to smoke-box, 4 bolts and 4 bolts and nuts.....		90	14
2 braces from back end of frame to boiler, 12 bolts and 4 nuts.....		132	18

				TENDER, ETC.				No.
				Wright.	Cast	Wood.	of	
				Brass.	Iron.	etc.	pieces.	
1 brace across frames in front of boiler, 3 studs and nuts.	81	7	41	6	4			
1 brace across frames behind boiler, 4 bolts.	66	5	37	6	7			
2 front braces from bed-casting to boiler, 8 bolts for same.	69	10	12	7	4			
1 angle-iron for back-brace on boiler.	16	1						
2 back-braces to boiler.	12	2						
2 front braces to boiler.	19	2						
4 bolts and nuts for same.	4	3						
FRAMES, ETC.								
2 frames, 4 pieces, 4 braces for bottom of jaws, 8 bolts, 16 nuts for same, 10 bolts and nuts for bolting frame together, 4 keys.	2,052	50						
1 brace across frames behind smoke-box.	41	1						
1 brace across frames in front of fire-box, 4 bolts.	49	5						
1 brace across frames behind back jaws.	40	1						
1 back end-rail.	198	1						
2 centre lugs (on fire box) for expansion braces.	82	2						
2 outside lugs for expansion braces.	58	2						
4 end bolts.	198	4						
52 bolts and nuts for " "	36	104						
BED-CASTING, ETC.								
1 bed-casting.	908	1						
1 piece angle-iron for same, 12 bolts and nuts.	28	25						
2 corner pieces, 2 bolts and nuts.	1	4						
CYLINDERS, ETC.								
2 cylinders.	2,333	2						
2 front cylinder heads.	104	2						
2 back " " 2 glands.	328	4						
2 studs and nuts for same.	29	64						
2 brass bushings for glands and 2 for stuffing-boxes.	5	4						
4 studs and 8 nuts for stuffing-boxes.	73	12						
2 front cylinder-head covers and 8 screws.	32	10						
22 bolts and nuts for fastening cylinder.	31	44						
Wood-lagging.	150	2						
2 pieces Russia-iron casing.	15	2						
CYLINDER COCKS, ETC.								
4 cylinder-cocks.	10	16						
4 pins, keys and washers, 2 rods.	6	10						
1 cock-shaft, 2 lower arms, 1 upper arm, 1 rod, 2 pins and nuts, 5 keys.	29	14						
2 stands for cock-shaft.	12	2						
1 rod for shaft, guide, handle.	25	4						
STEAM-CHEST, ETC.								
2 steam-chests, 2 covers, 2 glands.	623	6						
2 bushings.	1	2						
6 studs, 12 nuts.	3	18						
24 studs and nuts for steam-chests.	46	48						
2 oil-cocks.	15	2						
2 outside covers.	102	2						
2 pieces Russia-iron for steam-chests.	8	2						
2 brass mouldings and 14 screws for steam-chests.	20	16						
2 name-plates, 16 screws.	1	20						
4 end " " 20 " "	21	24						
VALVES, ETC.								
2 main slide-valves.	132	2						
2 main slide-valve yokes.	80	2						
2 brass guides for same.	15	2						
6 bolts and washers for same.	2	12						
PISTONS, ETC.								
2 piston-heads.	138	2						
4 packing rings, 2 follower-plates.	124	6						
6 bolts and 6 pins.	4	12						
2 piston-rods.	118	10						
2 piston-rod keys and pins.	5	4						
CROSS-HEADS, GUIDES, ETC.								
2 cross-heads.	209	2						
8 guide-bars, 4 lugs, 8 bolts, 4 nuts.	509	18						
8 cast-iron washers, 4 bolts and nuts.	80	10						
2 brackets for guides, 4 bolts and nuts.	80	10						
2 bottom braces for same.	20	2						
2 braces to boiler, 4 studs and nuts.	72	10						
4 rollers for slides.	19	4						
CONNECTING-RODS, ETC.								
2 main-rods, 4 straps, 4 gibs and keys, 8 bolts, 12 nuts, 4 set-screws, 4 bolts for oil-collar.	320	40						
4 pairs brass boxes and 4 stoppers for oil-collar.	60	10						
2 oil-collars for same.	14	2						
2 parallel rods, 4 straps, 16 bolts, 32 nuts, 4 keys, 4 set-screws, 4 steel plates.	289	66						
4 pairs brass boxes and 4 stoppers for oil-collar.	57	12						
4 oil-collars for same.	28	4						
CRANK-PINS, DRIVING-WHEELS AND AXLES.								
1 front driving-axle, 4 keys.	540	9						
1 back driving-axle, 4 keys, 4 sets screws.	493	9						
2 collars for driving-axle.	107	2						
4 driving-wheels.	5,324	4						
4 tires and 16 bolts and nuts.	3,360	96						
4 crank-pins and nuts, 12 front, 30 back.	160	8						
Lead for counter-balances.	640	4						
DRIVING-SPRINGS, ETC.								
4 driving-springs.	410	44						
4 straps, 4 rivets for same.	62	6						
2 long hangers, 2 pins and keys.	42	6						
2 short hangers, 2 pins and keys.	42	6						
4 short hangers, 4 keys.	44	8						
4 straps and pins for driving-boxes.	72	10						
4 castings and rubber for hangers.	50	10						
2 equalizing-beams for engine.	199	2						
2 fulcrums for do.	17	2						
DRIVING-BOXES.								
4 driving-box housings and oil-collars.	430	8						
4 driving-box brasses.	112	16						
8 bolts and keys for same.	6	10						
VALVE-GEARING.								
4 eccentric-rods.	300	4						
8 set-screws.	3	8						
4 pairs of eccentric-straps.	316	8						
10 bolts and 32 nuts for same.	16	48						
4 eccentric-rods.	228	4						
8 bolts for same.	4	8						
2 links (4 pieces), 2 saddles, nuts and washers, 2 hangers, 2 blocks, 4 bushings, 2 rocker-pins, nuts and washers, 4 eccentric rod pins, nuts and washers, 2 hangers, pins and nuts, 12 bolts and nuts, 4 thimbles.	152	70						
1 lifting-shaft.	185	1						
2 hangers for same, 4 bolts and nuts, 6 screws.	60	16						
1 counter-balance spring-case.	16	2						
1 counter-balance spring.	16	2						
1 bolt for chain, 2 bolts and nuts for fastening to frame, 1 centre-bolt, nut and washer.	5	8						
1 counter-balance chain, 1 bolt.	9	2						
2 rockers.	136	2						
2 top pins, nuts and washers.	182	2						
2 rocker-boxes.	6	24						
10 bolts and nuts, 2 bolts and washers.	40	24						
2 valve-stems, 2 straps, 2 keys, 2 ribs, 2 bolts and nuts, 2 set-screws, 2 knuckle-joints, 2 nuts, 2 pins and nuts.	40	24						
2 pair of boxes for same.	4	4						
REVERSE-LEVER, ETC.								
Reverse-lever handle, 2 bolts and nuts, 1 catch, 1 spring, 1 spindle, 1 stop, 1 guide, 1 gib, 2 set-screws.	54	14						
1 brass thumb-piece.	13	7						
Reverse-lever fulcrum.	39	7						
1 pin, 2 nuts, 2 bolts and nuts for do.	26	5						
2 quadrants, 2 bolts and nuts.	91	5						
1 support for quadrant.	3	6						
1 reverse-rod, 2 pins and keys.	3	4						
1 casting for end of quadrant.	3	4						
3 bolts and 1 nut.	3	4						
PUMPS.								
2 brass pumps and glands.	243	2						
4 studs and 8 nuts.	12	12						
1 pump valves and cages, 1 pipe for air-chamber.	41	10						
2 brass air chambers for pumps.	40	2						
6 bolts and nuts and 12 washers.	4	24						
2 lower air-chambers for pumps.	114	24						
6 bolts and nuts and 12 washers.	4	24						
2 feed-pipes from pump to check-valve, 4 brass nuts, 4 brass collars.	50	10						
2 pet-cocks.	15	2						
2 rods, etc.	15	2						
2 pump-plungers, 4 nuts and 2 pins.	61	8						
1 right-hand feed-pipe, 1 brass thimble, 1 old hat, 1 gland.	41	6						
1 left-hand feed-pipe, 2 pieces, 3 brass thimbles, 1 gland, 1 old hat.	37	6						
1 T piece for same.	12	7						
1 lazy cock.	12	4						
1 handle for same, pin-plate, piece angle iron, 4 bolts, 2 washers, 2 nuts, 1 lower lever, 2 bolts, 1 set-screw, 1 bracket, 1 rod, 1 lever.	56	19						
2 hangers for feed-pipes, 2 bolts and nuts, 1 piece wood.	30	12						
PUMP CHECK-VALVES.								
2 check-chamber bases and tops.	100	6						
6 bolts and nuts, 8 studs and nuts for same.	11	28						
2 valve cages and seats for do.	28	11						
2 brass acorns, studs and brass casing.	11	1						
INJECTOR, ETC.								
1 injector.	12	16						
1 casting for same.	19	1						
4 bolts and nuts for same, 1 small shaft, crank and handle, 2 nuts, 1 large shaft, 1 wheel, handle and pin.	18	17						
1 brass bushing.	2	1						
1 steam valve for injector.	8	2						
1 copper steam feed-pipe for injector, 2 nuts and 1 thimble.	16	4						
Waste and water feed-pipes for injectors, 3 nuts and 3 thimbles.	8	8						
1 copper pipe from injector to check (2 pieces), 2 nuts, 2 collars.	27	6						
1 injector check-chamber, 4 studs and nuts.	1	15						
1 injector check-valve cage and top.	5	3						
ENGINE TRUCK.								
4 wheels.	1,824	4						
2 axles.	604	2						
4 cast-iron collars, 8 set screws.	3	66						
4 housing-boxes and oil-collars.	233	8						
4 bushes for same.	2	16						
4 bolts and keys.	5	8						
8 cast-iron jaws.	346	8						
1 truck frame.	313	32						
16 bolts and nuts for top of jaws.	122	2						
2 bottom braces.	12	16						
8 bolts and nuts for same.	12	16						
2 truck springs (17 plates).	337	34						
2 straps, 2 pins, 2 rivets for do.	26	6						
2 equalizers.	229	2						
4 spring-hangers, 4 pins and keys, 4 stirrups, 4 pins and keys.	126	24						
4 castings for same.	141	94						
12 bolts and nuts for top.	18	24						
2 transverse braces.	40	2						
2 U bolts, 4 nuts for same.	80	10						
1 centre-pin and key.	17	2						
1 lower-centre casting.	105	1						
1 top.	300	6						
3 bolts and nuts for same.	8	2						
21 castings.	24	2						
CHECK-CHAINS.								
4 check-chains and eyes.	68	8						
eyes, 4 bolts and nuts on truck frame for chains.	41	10						
2 hooks, bolts and nuts for do.	23	6						
SAND-BOX.								
1 base, 2 links, 2 valves, 2 cast-iron levers.	218	7						
1 wrought-iron lever, 10 bolts, 1 nut, 2 rods, 1 pin.	12	15						
1 sheet-iron cylinder for sand-box, 2 pieces Russia-iron, 1 welt.	54	4						
1 cover.	65	1						



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EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subject pertaining to ALL DEPARTMENTS of railroad business by men, practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

DIVIDING TERRITORY.

There having been an agreement among the contending Northwestern railroads to hold a conference and submit their disagreements to arbitration, if not otherwise settled, and meanwhile to restore rates, the President of the St. Paul & Omaha Company, reading on his way home that the Chippewa Falls & Superior Railroad, which was built by Milwaukee & St. Paul directors, and has been worked in the interest of that company, had been formally transferred to the Milwaukee & St. Paul Company, declared all negotiations off; that this was an invasion of the St. Paul & Omaha territory, and that the question of the territory in which each company might and might not build or buy railroads was one of the things to be settled by the conference or the arbitration, and that to make the transfer pending negotiations concerning territory was a breach of faith.

Something might be said as to the special transfer in question, as being of a road already built, and which no possible action could prevent from dividing the traffic with the St. Paul & Omaha at the points where the two roads come in contact, and as to the assumption that a road owned by directors of the Milwaukee & St. Paul would be less a competitor than if owned by the Milwaukee & St. Paul Company; but we purpose here to consider the principle enunciated, that a railroad company has a right to the sole control of the traffic on its line and of the territory for a certain distance on each side of its lines, and the consequences that are likely to follow the adoption of this principle as a rule of action by American and especially by Western railroad companies.

The railroad policy of this country is based generally on the principle of free competition. Nowhere in the world are the railroads permitted to do as they please, with little restriction (except under the laws of a few states, which laws for the most part are so executed as to make the exception apparent rather than real). As a rule they fix their own rates, they construct their roads, rolling stock and stations as they please, they run as many and as few trains as they please, and at such speeds as they please. They build their lines where they please, and establish their stations where they please, often by so doing nearly destroying one village and building up others at places which they select. The theory of this public railroad policy is that the free competition of railroads freely permitted wherever any one may choose to build them,

will prevent, on the whole, any neglect in accommodating the public, any extortionate charges, and any great waste of the public wealth—or at least that the disadvantages of this free railroad policy will be less than those of any practicable system of government regulation and restriction. It is simply an extension of the *laissez faire* doctrine—the doctrine that in economic affairs things will take care of themselves if you will only let them alone—to railroad business. This doctrine is doubtless correct for the great mass of industries, and a great number of people, including some who are reputed as economic authorities, hold it not so much as a doctrine as a principle of universal application—as indeed, embracing in itself the whole science of economics. Mr. H. V. Poor, in a very interesting and well-stated article in the *New York Evening Post*, has recently labored to show that it applies to railroads the same as other industries.

We may say, in passing, that we totally disbelieve in the applicability of this doctrine to railroads and to railroad business. On the contrary, we feel perfectly sure that it does not work, that it never has worked, and that in the nature of things it never can work, so as to secure a rational and economical development of a national railroad system, the economical and efficient conduct of railroad transportation, or secure the rights of the community on the one hand, and of those who invest their money in railroads on the other.

But, notwithstanding this, we must all recognize the fact that the established American railroad policy is free trade in railroads and in railroad business. The nation depends upon this to check the abuses that might otherwise be practised by the railroad companies, and to secure the development of its railroad system.

And for this latter end it has, in many respects, worked well. It has not secured a railroad system altogether rational and economical, but it has secured rapidity and extent of development as could have been done probably in no other way. And rapidity and extent of development in a new country like this were perhaps of more importance than anything else. Very likely our public railroad policy so far has been the policy that was best for us at that stage of our growth, and especially with our form of government and the almost total lack of efficient administrative machinery or the faculty (in past days) of creating any. We have not done what was ideally best; we will not say that we have not done the best that we were capable of doing in this regard. And any change in this policy, if any is made (which we think probable) will probably be by slow degrees, and by the state itself adapting its laws and regulations to the actual circumstances.

Now what does the community depend upon to secure sufficient railroad accommodation, moderation of rates, and the construction of lines sufficient to serve all parts of the country that have developed traffic enough to support one? Mainly upon freedom of railroad construction. A place of 5,000 or 10,000 inhabitants may very likely afford more traffic than the aggregate reaching the road from 30 miles on either side of it. If there is another railroad within 10 or 15 miles of it, it is almost sure to build a branch to connect with that some time, because half or less traffic of such a place even at the lower rates that are the result of the efforts of the two competitors to get it, may be well worth the construction of a short branch, especially if that traffic will pass over 50, 100 or 500 miles of road already built. Actually the result has been that there is scarcely a place of 10,000 inhabitants in the United States which has not as many as two railroads, and usually competing roads unless one has absorbed the other, or the old line has built the new one itself to keep some one else from building it. And this latter is one of the ways in which the national railroad policy insures the extension of railroads on nearly every route that can support one. Thousands, and probably tens of thousands of miles of railroad have been built in the United States by old railroad companies, which would not have been built at all, or not have been built so soon, had these companies not feared that some rival would occupy the ground to their own detriment. In such cases, the public has not secured competition by the freedom of railroad construction, but it has secured what, to a large part of it, especially in a new country, is infinitely more valuable, namely, a railroad, the one thing indispensable, perhaps, to give value to the land, to double, treble, quadruple its value without the railroad. Doubtless the fact that this country was new, that vast areas of it were almost without value until provided with means of transportation, and that by such provision the market value of the land has been increased in the aggregate by thousands of millions of dollars, is what has made the country approve and

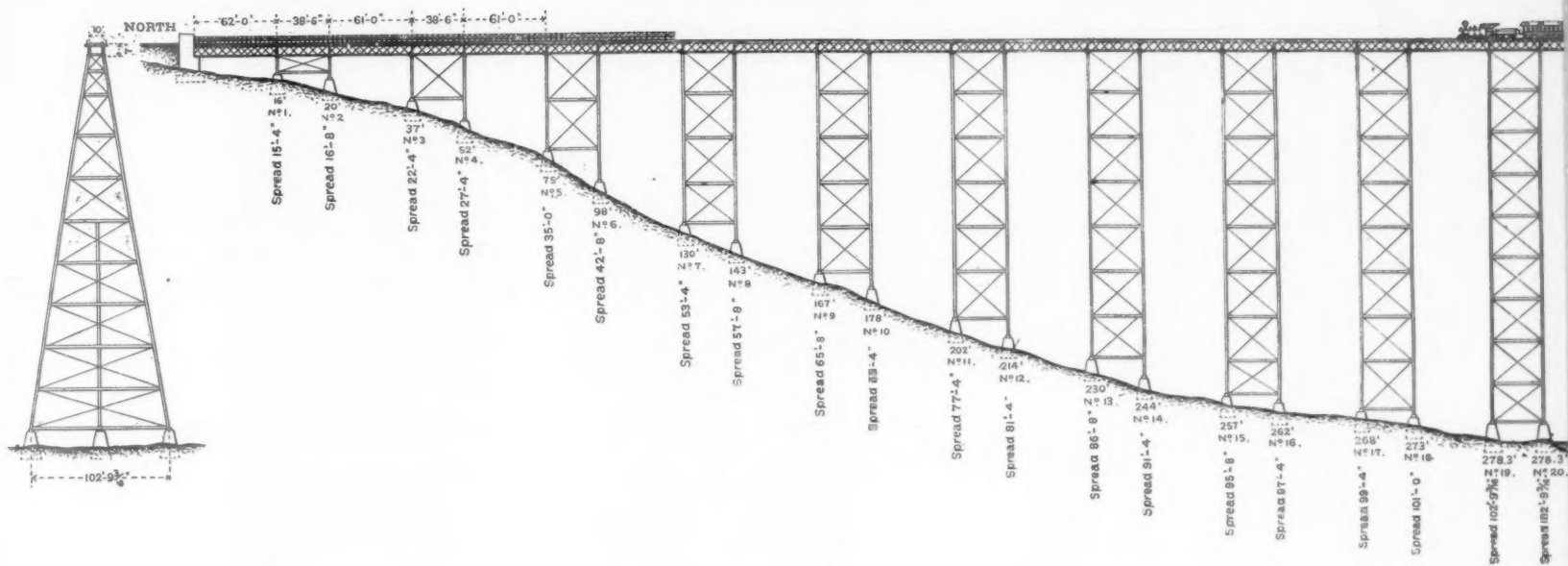
maintain its railroad policy, in spite of some drawbacks which are complained of, and even exaggerated. Especially is this true of the newer parts of the country. The landowners have been made rich by the railroad-builders, and though the former sometimes complain that they have to pay too much for railroad service, there is hardly a rational one among them, who owned his land before as well as since it has been served by a railroad, but will confess that the balance of advantage has been enormously in his favor. These benefits have been conferred where the railroads were wastefully constructed and worked, and all the lack of economy by an irrational formation of the railroad system, with in many places twice as many miles of road as were required to give all the accommodations they offer, the advantages immensely outweigh all such waste, though in most of the older parts of the country they will not longer do so.

Freedom of railroad construction, then, is the one feature of the national railroad policy which the people and the Western people especially regard with unequivocal satisfaction. They often make efforts to restrict freedom in rate-making, etc.; never freedom in construction. So far as their experience goes the multiplication of railroads is an immense benefit; and the evils of an over supply of railroads, some of which they already experience, they are not conscious of, and will not be, probably, till they have endured them many years, they being in their nature hidden.

Now comes the President of a railroad company and proposes that certain companies with which his own co-operates or competes shall, so far as a vast territory in Wisconsin, Minnesota, Iowa and Dakota is concerned, virtually abolish this freedom in construction which the people value so highly and which has to all new countries been of immense advantage, and parcel out the territory among the several companies, so that each may have a territory of its own within which it may do as it pleases—build when and where it pleases, or keep it useless altogether by not building at all. The Milwaukee & St. Paul may have a station with an important traffic which the Northwestern can only by a branch reach 20 miles long, through which it will secure traffic for 500 miles of road further east, and which will add value to a considerable area of land on its line, now distant from any station. But the Northwestern may not build this branch, for that would be invading the Milwaukee & St. Paul's territory. It will be compensated by the latter road's keeping out of its traffic preserves; but what of the landowner on the proposed branch? He finds the feature of the national railroad policy which is most useful to him repealed, as it were, by the action of the railroad companies. What will he do as to those other features, such as freedom in making rates, in the number of trains run, in the accommodations offered, which do not always work in his favor? There is little doubt that he will abolish that freedom too, and, if we may judge of his temper by his acts heretofore, with no such justification, the last state of those railroads will be worse than the first. They will not, after all, put an end to the freedom from which they suffer (and they certainly often do suffer greatly from it), but an end will be put to the freedom from which they profit, and there will in all probability be substituted for it a tyranny of restrictions which will make it impossible for them to earn a fair interest on the capital invested in them.

No community will submit to having the construction of competing lines checked by the action of those who already own railroads in it without in turn subjecting the railroads to strict limitations as to the charges they may make, and prescribing the accommodations they shall offer. No community ought to submit to any such one-sided restriction. No community is less likely to submit to it than that of the Northwest. The day that the railroad companies agree to establish such a restrictive policy they will sign their own death warrants.

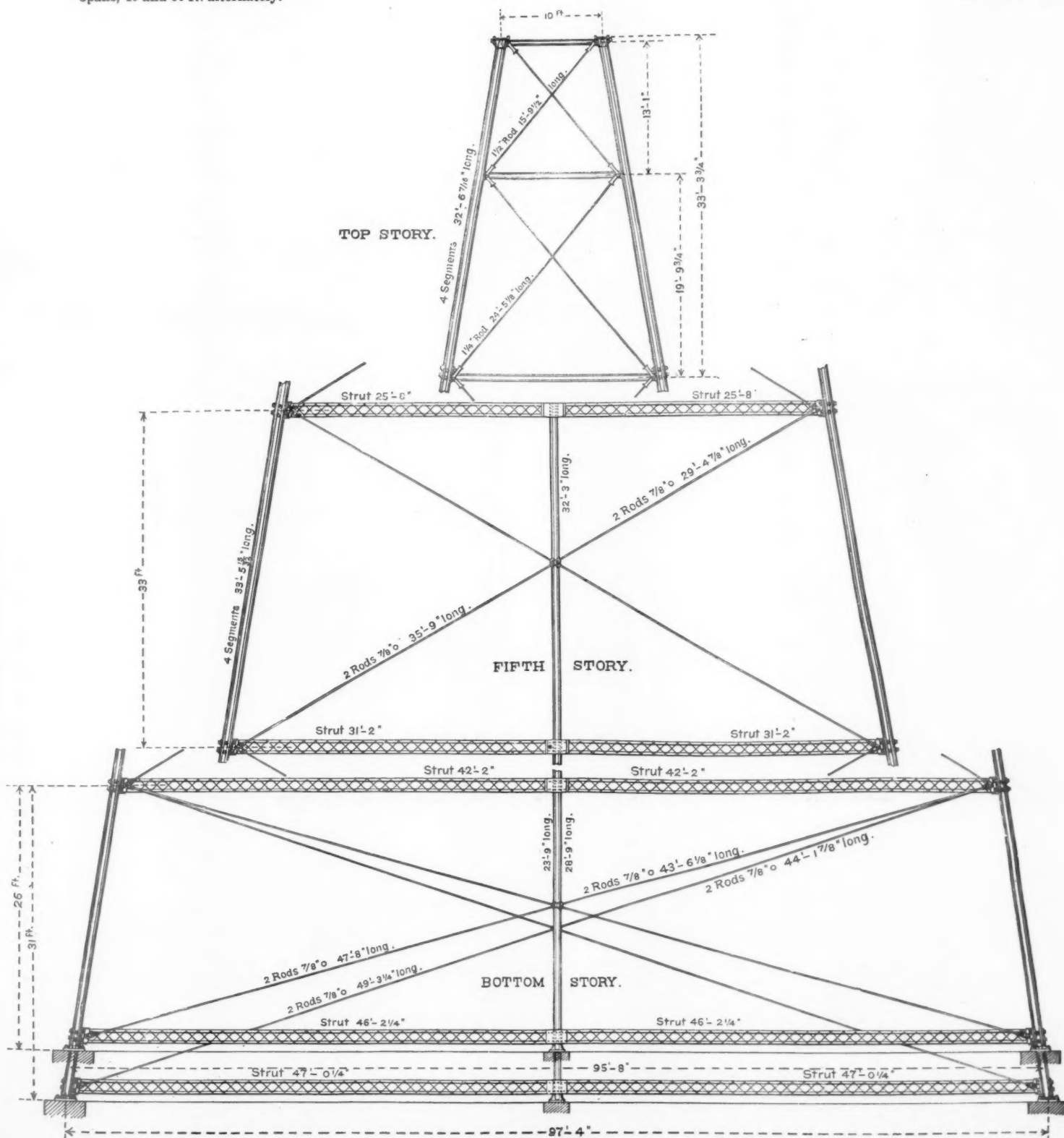
We fully believe that the greatest economy in railroad construction and operation can be effected only by the exclusive occupation of a given territory by a single system, and by the close co-operation of adjacent systems, and by a certain degree of co-operation of all the systems of a country, so that each line and part of a line may do that, and only that, which it can do best and cheapest. To be completely effective, the railroads must be worked as one system, and we have little doubt but that, by successive steps, little by little, going backwards at times, but on the whole advancing, we shall approach this ideal; and, if there shall be no radical legislation compelling great changes at once, that while approaching the ideal of the maximum effectiveness and economy we shall preserve many of the benefits of the individuality of separate lines and of competition. But we shall not reach this stage of a division of territory among sys-



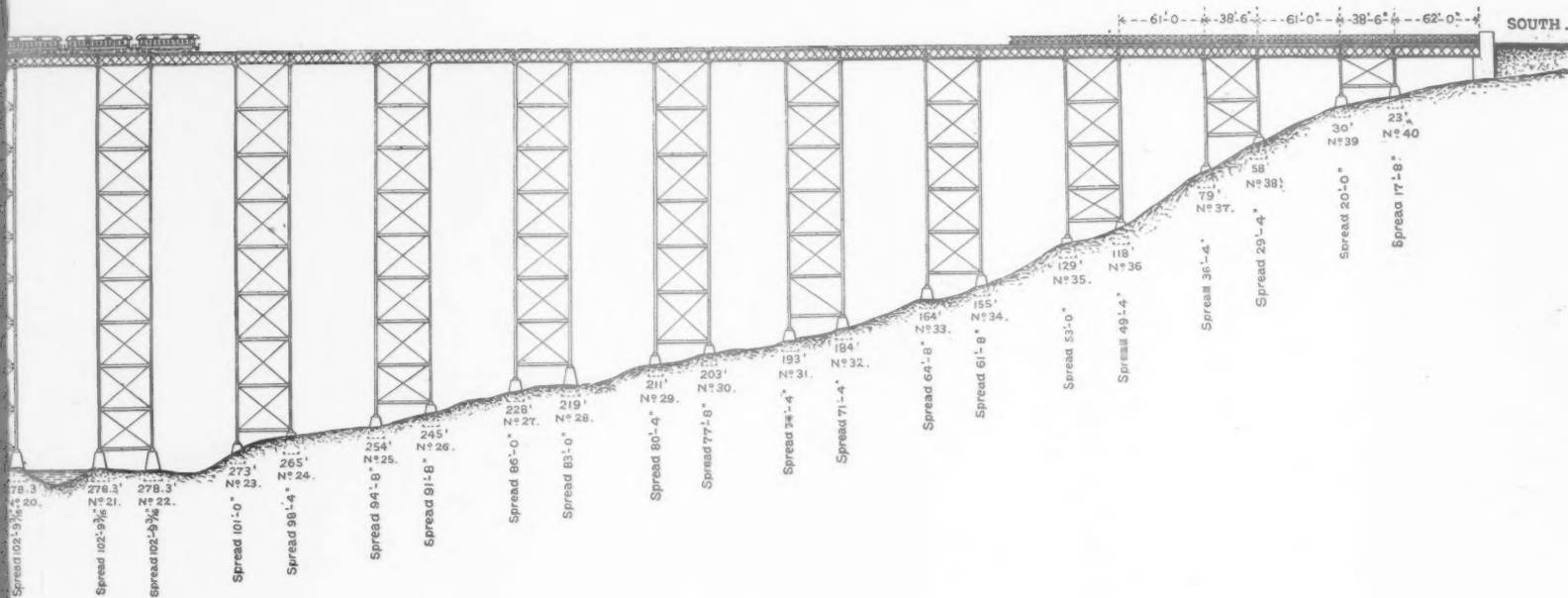
Total length, 2,052 ft.
Height at center, 301 ft.
Weight, 3,500,000 lbs.
Spans, 40 and 61 ft. alternately.

KINZUA

New York Lake Erie & Western



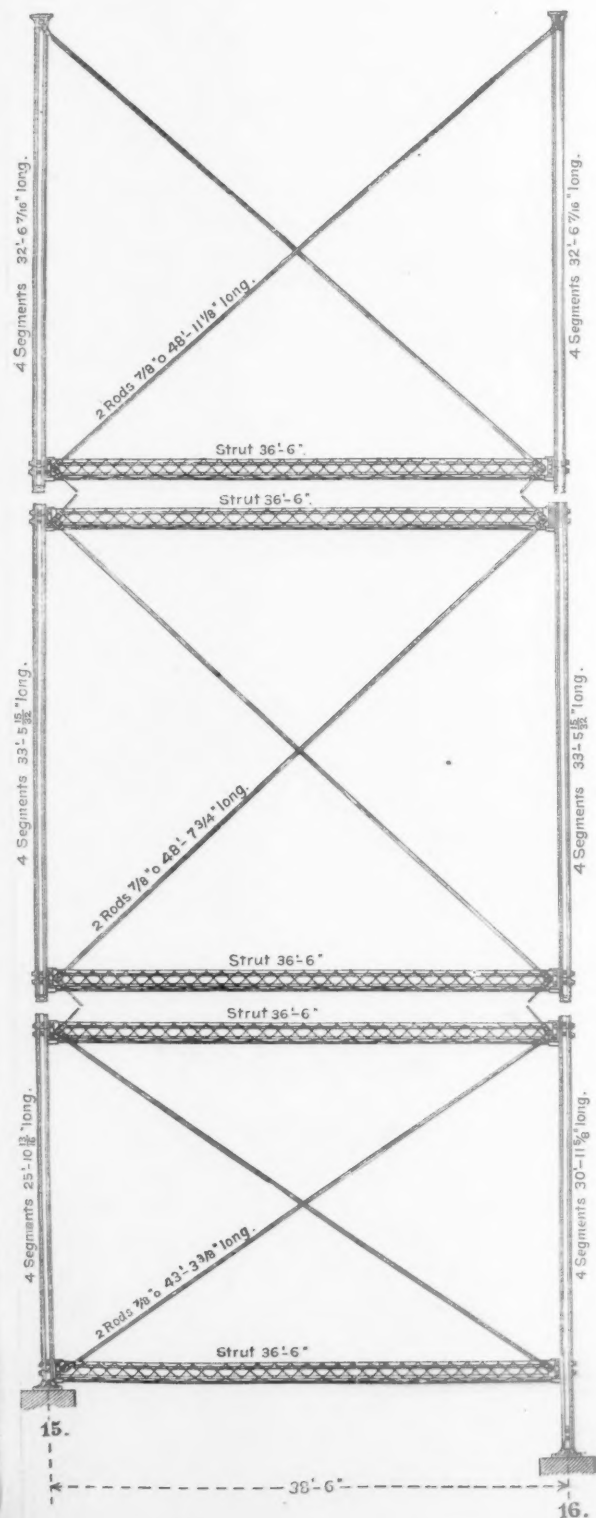
Sections of Towers.



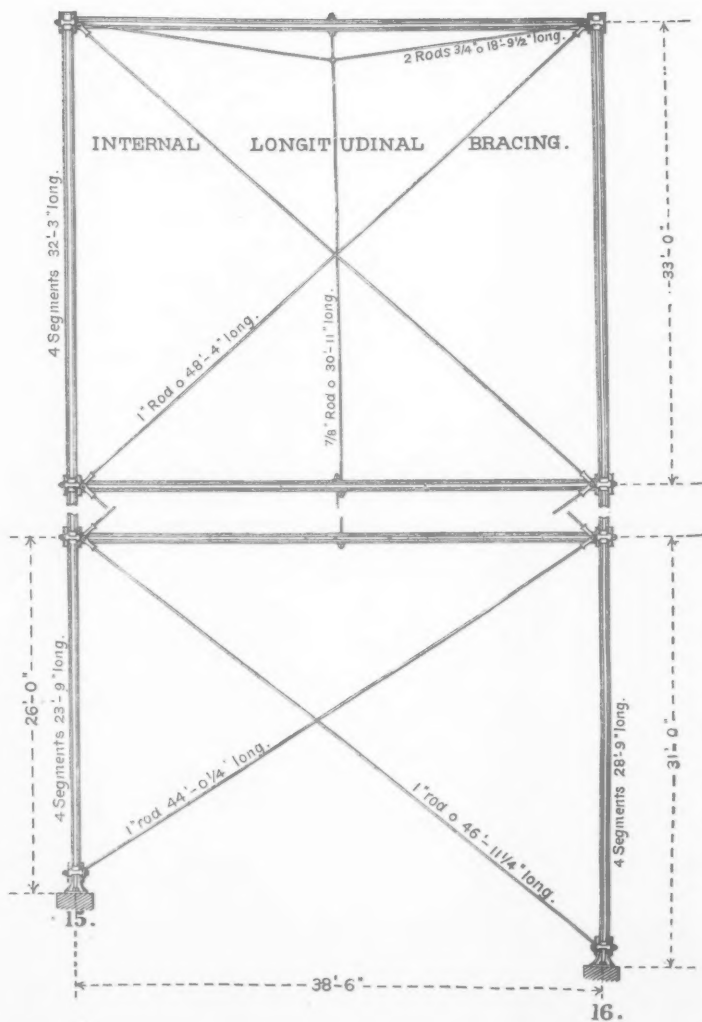
VIADUCT.

ern Coal & Railroad Company.

MESSRS. CLARK REEVES & Co.
Designers and Contractors
Phoenixville (Penna.)
Bridge Works.



Sections of Towers.



tems this year or next, or all at once, nor without previous modifications of existing systems, and probably with accompanying legal restrictions and regulations. The system now proposed is the French system minus the regulations which protect the community. There the country was parcelled out among six great companies, and one might not invade the territory of another. But the companies with these great privileges were by no means left to do as they pleased with them. Besides the lines which were sure to prove profitable and which they wanted to build, they were required to build in the aggregate thousands of miles of road which they did not want to build and which would not pay, and in great part do not pay yet. Moreover the construction of their roads and rolling stock, and the accommodations which they offer, must conform strictly to requirements established by the government and enforced by government officers of the highest training and skill and devotion to their duties. And they cannot make any rate for transportation without first submitting it to a cabinet minister and receiving his approval.

Now if the Northwestern railroad companies wish to adopt the territorial division of the French system in their own interest, they must expect to have other leading features of that system forced upon them in the public interest. In France the railroads are regulated by an authority almost as thoroughly informed concerning railroad business as the managers of the railroad companies themselves, and very unlikely to do the companies injustice. In this country if there is regulation, it is quite likely to be through demagogues, and almost certain to be by insufficiently informed men, who with the best intentions sometimes do grave injustice. But we need not argue this question. No one less than Northwestern railroad managers need to have pointed out the dangers of the kind of state regulation they are likely to have if they lead the people to think they need any. They will certainly get plenty of it if they attempt to limit the construction of railroads in the territory which they occupy.

HIGH PRESSURE STEAM IN LOCOMOTIVES.

Reference has been made in these pages a number of times to the fact that Mr. Underhill, the Superintendent of Motive Power of the Boston & Albany Railroad, is now using steam of a considerably higher pressure than has heretofore been employed in locomotives in this country. He has built a number of engines with larger and stronger boilers, adapted to the higher pressure. His new departure from the usual practice has attracted a good deal of attention and has led to much discussion of its advantages, and a good many master mechanics and railroad managers are now in an inquiring attitude of mind concerning the advantages gained thereby, if there are any.

With commendable enterprise the officers of the Boston & Albany Railroad have had a series of elaborate tests made by Mr. George H. Barrus, engineer, of Boston, with two of the new engines, which carried an average steam pressure of over 150 lbs., and with another engine of the old type, whose average pressure during the experiments was less than 130 lbs. The report of these experiments was given with great detail and was published in the *Railroad Gazette* of Nov. 10. They were intended to elucidate two points, first, the advantage of the Allen valve—one of the new engines having that valve and the other a valve of the ordinary type—and, second, the advantage of using high pressure steam.

It should be stated, before describing the experiment, that if a higher pressure of steam is used smaller cylinders will be required with an engine having a given weight on, and size of, the driving-wheels, or, conversely, that with the same size of cylinders an engine should have more adhesive weight with high than with low pressure steam. In building his new engines, Mr. Underhill conformed to the latter principle. He found a year or two ago that there was difficulty in taking the fast and heavy trains which were run over his road with the engines that were then in use for that purpose. He therefore increased the size and strength of the boilers, and consequently the weight on the driving-wheels, and left the cylinders the same size as before, but obtained the requisite traction power by raising the steam pressure. Several of these engines have been at work for more than a year, and, it is reported, have been doing excellent service.

As stated before, the experiments were made with two of those engines and with another with the same dimensions, excepting that its boiler was not so large as those of the other two engines, and the steam pressure was lower. All three of the engines experimented with had 18x22 in. cylinders, and driving-wheels 5 ft.

8½ in. diameter. The following table will give the principal particulars of the tests, on which some comments will be made.

Number of locomotive	Kind of slide-valve	Area of grate surface	Area of draught through tubes	Area of draught through stack	Area of each flue	Area of piston rod	Date of test	Miles run during test	Cars hauled Boston to Springfield	Cars hauled Springfield to Boston	Average steam pressure	Weight of coal fired, lbs.
150	Ordinary	1,012.00 sq. ft.	15.80 "	2.92 "	1.19 "	7,063 sq. in.	July 20	4 h. 50 min.	6 N. Y.	7 B. & A.	130	9,290
							July 21	4 h. 50 min.	6 B. & A.	7 N. Y.	139	8,174
129	Ordinary	1,245.00 sq. ft.	17.41 "	3.69 "	1.19 "	7,979 sq. in.	July 25	4 h. 50 min.	6 N. Y.	7 B. & A.	154	7,377
							July 26	4 h. 50 min.	6 B. & A.	7 N. Y.	155	7,033
169	Allen	1,245.00 sq. ft.	17.41 "	3.69 "	1.19 "	7,979 sq. in.	July 28	4 h. 50 min.	6 B. & A.	7 N. Y.	157	6,656
							July 29	4 h. 50 min.	6 N. Y.	7 B. & A.	157	6,656

+ Fram. means taken on at South Framingham.

The experiments of July 11, 12, 13 and 14 are not included in the table, because they were not made under the same conditions, and are said to have "little value" for showing what they were intended to prove, and also because the loads hauled are not given. Still the first experiments have some significance, which will be pointed out hereafter.

In estimating "the relative performance of the two engines at the pressures 160 lbs. and 130 lbs.," the relative economy is estimated by "the consumption of steam (in pounds), by diagram at cut-off, per indicated horse-power per hour," and the advantage resulting from the use of the higher steam pressure is thus estimated at 13.67 per cent. The number of pounds of steam consumed ought of course to equal the consumption of feed-water, less the waste by the injector, leakage, etc. The consumption of steam of engine 150 per indicated horse-power per hour is given at 22.71 lbs., and of feed-water 27.00 lbs., or 18.89 per cent. more of the one than of the other. In the case of engine 129 the consumption estimated in the one way is 19.63 lbs., and in the other 25.65 lbs., a difference of more than 30 per cent.

It is not explained from what data the calculations were made to determine the consumption of steam or feed-water per indicated horse-power per hour, excepting that it is said that indicator diagrams were taken every 2½ minutes. It seems extremely doubtful whether, considering the constant variation in speed, of grades, curves and the condition of track, any reliable results could be obtained by this method excepting from continuous indicator diagrams taken during the whole trip.

The feed-water was measured by a glass water-gauge, attached to the outside of the tank, and the quantity consumed was calculated from the number of inches of water indicated by the gauge, and the area of the tank. It is not stated whether any allowance was made for the contents of stays and braces inside of the tank. It is not easy either, unless a great deal of time is allowed for the water in the tank to get into a state of quiescence, to take a correct reading from a gauge of this kind, and very much the most certain plan to get at the contents of a tank is to fill it with water, place it on a scale, then let the water run out, and thus get the weight of successive inches. The waste of the injector, too, is an uncertain amount. Therefore, if we compare the great difference of the results obtained in the two ways, it is not surprising that the conclusion, stated in the report, should be that they "may be somewhat erroneous." This is rather a serious admission, when made with reference to the data on which the conclusions of an elaborate series of experiments rest—so serious indeed, that when taken in connection with the discrepancies pointed out, it makes these conclusions quite untrustworthy. After explaining some of the causes for the discrepancies the report says: "Under all the circumstances 7.5 per cent. appears to be a fair allow-

ance for the difference in the actual consumption of steam produced by the higher boiler pressure." Surely such methods of arriving at conclusions have not that degree of certainty and definiteness as to merit being regarded as scientific.

The fact is, that for the purposes of a comparison of the relative economy of two locomotives, or of the advantages of high and of low pressure steam, the consumption of steam or water per horse-power per hour has little or no practical value. The question which the railroad manager and its stockholders are interested in is, how much coal will the engine burn in hauling a given train over the road in a given time. They are not concerned about the amount of "combustible" or the unconsumed coke left in the refuse after the run is made. What they want to know is how much or how little coal must be supplied, and paid for, to do the work specified. Therefore the "weight of coal fired" is the important consideration in the experiments. The figures giving the weights, for the six last tests are given in the table herewith. From this table it will be seen that the loads hauled were the same in each case, excepting for the test of July 20, when an extra car was taken on at Framingham. The time and distance were the same in each case.

In analyzing the figures, one fact should be kept in mind, which any one who has ever made any experiments with locomotives has probably observed; that is, that there is nearly always, in the beginning of any experiments of this kind, a progressive decrease in the amount of fuel burned in each successive trip. Of course, the minimum consumption is soon reached, but in the first trips made, it will nearly always be found that the men who run the engine will reduce the consumption of fuel with each repetition of the experiment. This, with one exception, is the case in the experiments we are considering, and is shown in the following table:

	No. of engine.		
	150.	129.	169.
Fuel consumed 1st test, lbs.	9,260	8,707	8,284
" " 2d " "	8,174	8,770	7,594
" " 3d " "		7,377	7,214
" " 4th " "		7,033	6,656
		21,887	29,748

This last table includes the four tests which were omitted in the first table. From the last it will be seen that the only case in which there was not a progressive decrease was in the second test of engine 129, and there was then a difference of only 63 lbs. of coal between that consumed in the first and that in the second test. As the loads hauled by engines 129 and 169 during their two first tests are not given, the comparison of course is somewhat blind, but the progressive decrease of fuel consumption will be noted in each column. If we compare the fuel consumption of the three engines in the first test of each, it will be seen that engine 150 (with low pressure) burned 558 lbs. more coal than 129 and 976 more than 169. Engine 150, however, took an extra car at Framingham. The loads of the other engines in these tests are not given. In the second tests engine 150 burned 596 lbs. of coal less than No. 129 and No. 580 more than 169. The third and fourth tests of 129 and 169—the high pressure engines—show a considerably less consumption of fuel than was burned by engine 150 in the first and second test. What we want to point out, however, is, that if the experiments with engine 150 had been continued, probably the fuel consumption would have been reduced still further, as it was by the other engines in their successive tests. In fact, the last table indicates that probably if engine 150 had "had the same show" as the others had it would have done equally well.

The inference, then, regarding these experiments and the report must be that the conclusions are not proved. The question at issue, however, is so important and interesting that it is to be hoped Mr. Underhill will make another series of experiments with two or more of his new engines, having the same dimensions throughout, with the difference only that the safety-valves of the one be set to carry 130 lbs. steam pressure and those of the other to carry 160. The passenger trains between Boston and Springfield run with a sufficient amount of regularity, both as to time and number of cars hauled, that the experiments could be made in the regular service of the road. The only record that it is important to keep is the weight of the fuel burned and the time of the train. A careful and intelligent apprentice boy could do this, and the results would have a great interest to railroad men generally. In making such experiments, it would be

desirable, after the men who run the engines have done the best they can with each, to change them from one engine to the other. This would indicate how much of the economy is due to the skill and individual exertions of the engineers and firemen.

But even if it did not, the case in favor of the high pressure steam would not be proved, because if engines are worked at all hard, there can be little doubt that a big boiler will be more economical than a little one. Now the first table will show that the two high-pressure engines have 23 per cent. more heating surface and nearly 9 per cent more grate surface than the low-pressure engine. That the boiler of the latter must be forced more than the large ones is shown, too, by the smaller area of the blast orifices. Those of one of the large boilers have 12.8 per cent. more area than those of the small boiler. A test made with engines having such different dimensions may indicate the advantages of a large boiler, but does not prove what is gained by high-pressure steam.

The two columns of the last table give some indication of the influence of the Allen valve in fuel consumption. The relative performance of engines 129 and 169 is tabulated in the second table. From this it will be seen that in the four tests which were made by each of these two engines, engine 169, with the Allen valve, burned 2,139 lbs., or a little over 7 per cent., less coal than engine 129 with the ordinary valves. Considering the extremely simple means by which this economy is attained, if it is confirmed by further investigations, it would surely show the extreme of economical blindness if these valves are not generally used. The figures show, too, the great value of intelligently and carefully made experimental investigations of this kind. If locomotive superintendents have for more than 20 years past had a device as simple as the Allen valve lying at their very doors, and if it should appear that they have not had the enterprise to ascertain its value, it is time that they should be disturbed in their contentment with things as they are. The Allen valve is not a complicated trap or an ingenious nostrum, but a simple, practical device which can be used without risk, and the patents on it have expired. Unless there is something not apparent in the significance of the figures which Mr. Underhill has given, the adoption of that valve will save most railroad companies each year many times the salary which a competent locomotive superintendent should have.

We are certain that master mechanics generally will unite with us in the hope that Mr. Underhill will continue the tests of his engines. He has made a new departure, and, as the Jerseymen say, we want him to tell us "what there is into it."

THE UNION OF THE MICHIGAN CENTRAL AND THE CANADA SOUTHERN.

The agreement between the Michigan Central and the Canada Southern companies, has now been made public. By it the two properties are united so as to make a line from Buffalo and Suspension Bridge to Chicago, with a great system of branches in Michigan and a few in Canada, altogether forming a system comparable to that of the Lake Shore & Michigan Southern, but with a considerably greater mileage and a considerably smaller capital. In its effects on the strength of the two corporations this union is one of the most important recently made.

Under the agreement the Canada Southern is to transfer its road and other property to the Michigan Central, to be operated by it for 21 years. It agrees to issue \$6,000,000 of second-mortgage 5 per cent. bonds, the proceeds of which are to be expended in constructing a branch to the Niagara Falls, the acquisition of a bridge over the Niagara, the replacing of Kettle Creek Bridge with a permanent structure of iron, stone or earthwork for a double track, the laying of a second track on such parts of the line as the Michigan Central shall deem necessary for prompt and economical working; for extending existing branches and constructing such new ones as may be found desirable; for increasing the equipment of the Canada Southern to 125 locomotives, 45 first-class and 30 second-class coaches, 6 baggage mail and express cars, 25 baggage cars, 3 dining cars, 2,600 box cars, 200 stock cars, 50 oil cans, 500 flat cars, 60 caboose cars, and 100 coal cars; and for making such other additions and improvements as may be agreed to from time to time. The Canada Southern reserves an amount not to exceed \$1,000,000 to meet certain claims now in dispute. When all is issued, it agrees that its total fixed charges, including interest and rentals, shall not exceed \$1,000,000 a year.

The Michigan Central agrees to work the Canada Southern's lines as if they were its own, pay the taxes on its property, the interest on its bonds, and certifies

that its own fixed charges, including interest and rental amount to no more than \$1,725,000.

It agrees to send over the Canada Southern all the traffic it can control which can be reached by it, or its connections, and to foster its present interchange of business with its southwestern connections.

From the gross earnings of the united systems there shall be paid, first, the cost of maintenance and operation, second, the fixed charges (interest and rentals) of both companies; and the balance shall be divided in the proportion of two-thirds to the Michigan Central and one-third to the Canada Southern.

After the expiration of five years, of ten years and of 15 years of the 21 years covered by the agreement, either party may call for a readjustment of the percentages, and in case of disagreement, the percentage of each shall be fixed by arbitration.

If the fixed charges of either company shall be reduced hereafter (as the Michigan Central's soon will be by the operation of a land grant and retirement of 8 per cent. bonds by 5 per cents.), that company shall have the whole benefit of the reduction. Increases in fixed charges made for the purpose of improving the property are to be paid, like the present fixed charges, out of the joint net earnings.

The Niagara Falls Branch of the Canada Southern and the renewal of the Kettle Creek Bridge are to be made at once; the Niagara River Bridge as soon as the requisite authority can be obtained, but the second track and the additions to equipment only as required by traffic.

There is also provision for the further increase of equipment and terminal facilities, if more than what is above named shall be required.

This contract is equivalent to a lease, inasmuch as it gives possession and management of the Canada Southern's property to the Michigan Central; but the terms of payment make it perhaps more like a co-partnership, with the Canada Southern a silent partner, as the two parties to the agreement are entitled to fixed proportions of the profits of the joint properties, and the one which takes the position of lessor does not receive a fixed sum for the use of its property. It is not, however, very different from leases for a proportion of the gross earnings, which are very common, the difference being one which makes the company working the lines more intimately interested in keeping down the fixed charges of the lessor company, at the same time that it is interested in keeping up its condition. The provision for a revision of the terms of the lease every five years seems a very wise and just one, as there may possibly be developed considerable changes in their relative importance in course of time.

The system thus made by the union of two companies' lines we have compared above to the Lake Shore & Michigan Southern system—a main line from Buffalo to Chicago with a great number of branches.

There are some striking differences in the country and the traffic of the two systems, though they adjoin. The line from Buffalo to the Detroit River north of Lake Erie is singularly poor in local traffic, having but one town of as many as 2,000 inhabitants on about 350 miles of road in Canada, and its local freight traffic in the year when it was largest was but 8 per cent. of its total, and equivalent only to 90,938 ton-miles per mile of road—to 123 tons (say ten car-loads) each way daily over its whole mileage; while the Michigan Central's local traffic last year was equivalent to 247,062 ton-miles per mile worked, or to 338 tons each way daily over the whole mileage.

There is doubtless a great contrast between the traffic of this Canada line from Buffalo to Detroit and Toledo and that of the Lake Shore's line between the same places. The Lake Shore has such towns in it as Dunkirk, Erie, Ashtabula, Sandusky, and above all Cleveland, with which the Canada Southern has nothing to compare, and probably never will have. The Lake Shore has the benefit of the enormous coal, ore, iron and oil traffic of the south shore of Lake Erie, which the Canada Southern is not in position to enjoy. The Lake Shore, cut off by the lake from Canada on the north, has numerous connections bringing traffic from the south, some of them worked under the same general management and intended to serve it; the Canada Southern has only the much less populous and productive country of Western Ontario on its north, and with this its connections are extremely meagre, so that the local traffic is left almost entirely to other companies. In that direction it has an opportunity to develop somewhat. There is a little petroleum, but no coal and no ore on the line, and the low forest land on its route contributes but little farm products and little timber, apparently, as it has always been easily accessible through the lake.

As to what the effect of the union will be on the fortunes of the two companies, we can only estimate

roughly. Heretofore the Canada Southern has had (under the Scott award) 40 per cent. of the Michigan Central's through passenger traffic between the Detroit and Niagara rivers and 45 per cent. of its freight; by the union it will have the whole, so far as it can be controlled, as nearly all of it can be. Just how much this traffic is we cannot say. But we know from the reports of the Michigan Central what its total through traffic has been—the traffic passing over it between Detroit and Chicago. Not all of this traffic, it is true, passes between Detroit and Buffalo, but by far the larger part of it does. Moreover, an enormous traffic originates on the thousand miles of the Michigan Central's lines, and a great deal of this, local to the Michigan Central, passes between the Detroit and Niagara rivers, and can be controlled much more completely than the through traffic, and this should certainly more than make up for the through traffic which does not pass between Detroit and Buffalo, and that which may be diverted to the Grand Trunk. At least as to freight it seems reasonable to suppose that the Michigan Central will be able to turn over to the Canada Southern a traffic as large as its total freight traffic through between Chicago and Detroit, instead of 45 per cent. of it as heretofore.

Now this through Michigan Central traffic amounted to 2,066,177 tons in 1881, and to 1,925,436 in 1880. We may then assume that there is about 2,000,000 tons of through traffic which the Canada Southern may carry over its line for the Michigan Central. Under the Scott award it has had 900,000 tons of this, making over its old line between Detroit and Buffalo about 230 millions of ton-miles, out of a total of 418 millions carried by it in 1880, and 451 millions in 1881. The Canada Southern receives a third of the Wabash through-traffic, and what it can get at Detroit and Toledo from the other independent roads with termini there, but it is not probable that these in the aggregate give it so much as the Michigan Central, so that our estimate of the through traffic which the Michigan Central can control seems a reasonable one.

If now the Canada Southern gets 2,000,000 instead of 900,000 tons of through freight from the Michigan Central, it will have (with a shorter line) about 470 millions of ton-miles from this traffic instead of 230 millions, and as its share of the earnings will be greater when its line is shortened, the addition to its earnings will probably be nearly in proportion to its tonnage rather than in proportion to its ton-miles, or as 500 hereafter to 230 heretofore, rather than as 470 to 230; but taking the latter figures we have an addition of 240 millions of ton-miles to the traffic of the Canada Southern, without counting on any growth of traffic. At the rates of 1881 for six months of the year, the lowest ever known, such an addition to its through traffic would produce about \$1,120,000; at the rates of 1880 it would produce about \$1,440,000. And this addition, producing nearly 50 per cent. of its total freight earnings in 1880 and 43 per cent. in 1881, could be earned certainly with an addition to expenses much less in proportion.

With regard to passenger traffic there is much more uncertainty. A much larger proportion of it, doubtless, has been contributed by the Grand Trunk and from Canadian points on the Great Western, including doubtless much the larger part of the emigrant traffic. The passengers ticketed through, however, to and from the Michigan Central and points east of Niagara River can be turned over the Canada Southern doubtless quite completely, as this and the Great Western are but intermediate links of a long line, and the passenger, if he can go by way of Suspension Bridge or Buffalo to Detroit will hardly know by which road he goes, at least will have little choice about it.

The number of through passengers over the Michigan Central in 1880 was 222,391; in 1881, 245,154; of whom 79,053 were immigrants in 1880 and 70,000 in 1881. Doubtless a much larger proportion of these through passengers than of the through freight was carried only between Detroit and Chicago, or at least did not travel between Detroit and Buffalo; but this also may be counterbalanced by passengers to and from other Michigan Central stations who are ticketed to and from Buffalo. But so large an amount of the Michigan Central's through passenger traffic has been to and from Canadian points that it is not probable that anything like so large a proportion of its passengers as of its freight can be turned over the Canada Southern, and by the union of the Grand Trunk and the Great Western a large part of this traffic will be lost—would be lost in time, doubtless, whatever the relations between the Canada Southern and the Michigan Central. But, doubtless, the passenger traffic of the Canada Southern will be immensely increased by the union. The Michigan Central has a very large share of the travel

between the West and New York and New England, and by far the largest part of this can be turned over to the Canada Southern. Whether this will largely overbalance the loss that may be expected by the probable diversion of much of the Canada travel, or even only equal it, we have not sufficient information to decide. There has also been a very considerable interchange of freight between the Michigan Central and the Canada roads. Large interchanges must continue, as they are adjacent systems with many junctions, but the Michigan Central must expect to lose much of this traffic by the amalgamation of the Grand Trunk and the Great Western, and this, indeed, was one of the chief reasons for uniting it with the Canada Southern. Possibly what may be lost in this way by the Michigan Central will equal all the Canada Southern may gain in passenger traffic; but even this ought to leave an increase of as much as \$1,400,000 the first year in the gross earnings of the two roads as the result of their union. As this would be the result of a pure addition to the through traffic, and chiefly in freight traffic, on about 250 miles of road, and would be conducted with an addition to train mileage on that line only, and but a moderate one there (as very large trains can be hauled over it), the addition to the expenses on its account ought not to be more than 50 per cent. of the addition to the receipts from that traffic, with rates as they have been for the last half year. This is not saying by any means that the road can be worked for 50 per cent. of its earnings; only that it can carry the probable addition to its traffic with an addition to its total expenses equal only to half of the receipts from this traffic. If so, the two companies would have an increase of \$700,000 in their net earnings as the result of their union, with an addition, probably, of not more than \$150,000 to their fixed charges that year (as the bridge can hardly be completed till near its close, and but little second track will be required the first year). If so, there will be a profit by the union of about \$550,000 the first year.

As the fixed charges of the two companies must be paid from the joint net earnings, we cannot calculate from this each company's share of the gain. On the aggregate stock of the companies it would be nearly \$1.40 per share more than would be earned under the arrangements existing heretofore, so that a very substantial gain is made by the union, if our estimates of traffic to be gained and lost by it are correct. The nature of the data existing does not permit them to be exact, and so far as passenger traffic is concerned we cannot venture to make approximate figures even, still less for the traffic which will be diverted from the Michigan Central, though so far as this is concerned, it will probably be diverted in any event, so that it may have little to do with the gain effected by the union over what could be had hereafter without such a union.

With the very bad earnings of 1881, and the fixed charges of the two companies as they are likely to be next year, the surplus of the two companies would have been about \$915,000—\$305,000 for the Canada Southern (against \$18,288 actual) and \$610,000 for the Michigan Central (against \$591,000 actual). With the very good earnings of 1880 the surplus would be about \$2,660,000—\$1,772,000 for the Michigan Central (against \$1,487,000 actual with the fixed charges as at present), and \$887,000 for the Canada Southern. With the traffic as it now is and promises to be for the first half of next year (that of the second half being dependent on the next harvest and other events we cannot foresee), the traffic and earnings in 1883 will be much more like those of 1880 than like those of 1881—indeed very nearly if not quite equal to those of 1880, aside from the changes caused by the union. This would give \$9.45 per share on the Michigan Central stock and \$5.91 on the Canada Southern. Both of the roads, and the Michigan Central especially, have grown since 1880, and have a much larger local traffic.

There is little use, however, in speculating on what the actual profits of the two companies will be under the new arrangement, as they will depend very largely on circumstances not affected by it—on the crops, the general condition of business in the country, and on harmony among the trunk lines. It is the effect of the arrangement itself that determines the wisdom of it, and this effect seems likely to enable the two companies to make together a profit of half a million a year more than they could without it, or a larger sum, without any growth of traffic, in which profits the two companies will share, the Canada Southern, which will carry nearly the whole addition of the traffic, getting more per share of stock than the other company, though perhaps not so much in the aggregate. The further motive that both companies were weak and exposed to dangers without such an arrangement and strong with it is of itself sufficient to justify it. It gives a railroad system ex-

tending from Buffalo and Niagara Falls on the east to Toledo, Detroit, Saginaw, Grand Rapids, Mackinaw, Chicago and Joliet on the west, with a network of 1,450 miles of road, 1,085 miles of which are in the populous and growing state of Michigan and further west, extending entirely across the lower peninsula from north to south as well as from east to west, and making about one-fourth of the total railroad mileage of that state. It has not the great connecting lines on the south which pour traffic over the Lake Shore, except that it has an equal share with the Lake Shore of the immense Wabash freight traffic; but it has freer scope for the development of local traffic to the north and on its own lines, on some of which the country has but fairly begun to develop, and has less to fear from new lines. Under ordinarily favorable circumstances it should improve decidedly hereafter.

October Accidents.

Our record of train accidents in October, given in full on another page, shows for that month 136 accidents, in which 47 persons were killed and 132 injured. The record includes 58 collisions, in which 24 persons were killed and 68 injured; 74 derailments, in which 23 persons were killed and 63 injured; and 4 other accidents, in which one person was killed.

In 26 of these accidents one or more persons were killed; in 30 there was injury but not death, leaving 80, or 58.8 per cent. of the whole number, in which no injury to persons is recorded.

Forty-five of the killed and 86 of the injured were railroad employes, while only two of the killed and 46 of the injured were passengers. Employes were 95.7 per cent. of the killed, 65.2 per cent. of the injured and 73 per cent. of the whole number of casualties, an unusually large proportion.

As compared with October, 1881, there was an increase of five accidents, of 16 in the number killed and a decrease of one in the number injured.

These accidents may be classed according to their nature and causes as follows:

COLLISIONS:		
Rear collisions.....	39	
Butting collisions.....	14	
Crossing collisions.....	4	
Passing collision.....	1	
DERAILMENTS:		
Broken rail.....	7	
Spreading of rails.....	6	
Broken bridge.....	3	
Broken axle.....	3	
Broken wheel.....	1	
Land-slide.....	1	
Wash-out.....	1	
Accidental obstruction.....	3	
Man on track.....	1	
Cattle on track.....	12	
Misplaced switch.....	6	
Purposely misplaced switch.....	1	
Rail removed purposely.....	1	
Malicious obstruction.....	3	
Unexplained.....	25	
Other:		
Broken connecting rod.....	1	
Broken eccentric rod.....	1	
Broken axle not causing derailment.....	1	
Broken wheel not causing derailment.....	1	
Total.....	136	

Seven collisions were caused by trains breaking in two; six by misplaced switches; four by fog; three by failure to use or obey signals; two by mistakes in giving or receiving orders; two by runaway trains, and one by failure of air-brakes to act in consequence of neglected couplings.

Of the three broken bridges one was a wooden trestle, which is said to have been damaged by fire, and one was a small wooden bridge which had been standing for some years. Besides these three, one span of iron bridge is recorded as failing in consequence of a collision occurring upon it, which so damaged one of the trusses that it gave way.

No boiler explosion is recorded during the month, which is a somewhat unusual thing.

A general classification of these accidents is as follows:

Causes:	Collisions.	Derailments.	Other.	Total.
Defects of road.....	9	16	4	29
Defects of equipment.....	9	5	4	18
Negligence in operating.....	49	6	..	55
Unforeseen obstructions.....	17	..	..	17
Maliciously caused.....	5	..	..	5
Unexplained.....	25	..	..	25
Total.....	58	74	4	136

Defects of road caused 11.8 per cent. of all the accidents and defects of equipments, 13.2 per cent., while 40.4 per cent. of the whole number were due to negligence in operating, that is, they might have been prevented by more care and stricter discipline.

There were 88 accidents in daylight and 48 at night. Apparently there should be a greater liability to accidents at night, but as a rule there are many more mishaps in daytime than in darkness.

A division according to classes of trains and accidents is as follows:

Accidents:	Collisions.	Derailments.	Other.	Total.
To passenger trains.....	3	28	4	35
To pass. and a freight.....	19	46	..	65
To freight trains.....	30	46	..	76
Total.....	58	74	4	136
Casualties:				
Killed by.....	24	23	..	47
Injured by.....	68	63	1	132
Total.....	92	86	1	179

This shows accidents happening in all to 194 trains, of which 76, or 39.2 per cent., were passenger trains, and 118, or 60.8 per cent., were freight trains.

The weather of the month was generally mild and pleasant, with few storms and no hard frosts. It was upon the whole a favorable month for railroad operations and for putting tracks in order for winter.

The marked features of the month were number of misplaced switches, by which there were 12 accidents in all, six collisions and six derailments, and the number of maliciously caused derailments, five being recorded, of which one was caused by breaking a lock and misplacing a switch, one by removing a rail and three by obstructions placed on the track. The number of broken rails is large for a fall month with no very cold weather.

An unusual accident is reported, the derailment of an engine by running over a man. Not, unfortunately, that it is at all unusual for trains to run over men, but the body of a man does not usually present sufficient obstruction to the wheels to throw them from the track.

Reference has sometimes been made to the cost of accidents and it has been said that some general statement of the expense arising from them would be desirable. Such a statement, however, is entirely impossible. It would require an investigation into each accident, and it is generally difficult even for the officers of a road where an accident occurs to make at the time more than a guess at the probable loss caused by it. Moreover, in cases where persons are killed or injured in such a way as to give themselves or their heirs a claim for compensation, it is often months and even years before the amount of damages is fixed, and long and costly litigation follows. There is a wide variety in accidents, from the little freight derailment where perhaps \$10 may cover all the repairs required, up to the great disaster like those at Ashtabula, May's Landing or Wollaston, where the cost runs up into the hundreds of thousands, and an apparently trifling piece of carelessness may cost stockholders a year's dividend. It is, however, entirely safe to say that accidents are a considerable item of expense, and that money spent in improved signals and appliances and other forms of prevention is a good investment. Perhaps the very best method of prevention is the payment of wages, sufficient to secure the permanent service of careful and capable men. A single cheap and incompetent man may cause a company more loss in an hour than a cut in wages would save in a year.

For the year ending with October the record is as follows:

	Accidents.	Killed.	Injured.
November.....	153	50	130
December.....	113	36	96
January.....	137	41	198
February.....	88	23	69
March.....	99	29	101
April.....	81	18	61
May.....	94	24	86
June.....	72	35	193
July.....	92	18	56
August.....	139	46	218
September.....	153	34	136
October.....	136	47	132
Total.....	1,337	401	1,400
Totals, same months, 1880-81.....	1,492	397	1,687
" " " " 1879-80.....	953	280	1,042
" " " " 1878-79.....	880	182	685

The averages per day for the month were 4.39 accidents, 1.52 killed and 4.26 injured; for the year they were 3.66 accidents, 1.10 killed and 4.01 injured.

The average casualties per accident were, for the month, 0.346 killed and 0.971 injured; for the year, 0.300 killed and 1.096 injured.

The averages per month for the year were 111 accidents, 33 killed and 122 injured, against similar averages of 124 accidents, 33 killed and 141 injured in 1880-81; 79 accidents, 23 killed and 84 injured in 1879-80; 74 accidents, 15 killed and 57 injured in 1878-79.

The number of accidents in October was exceeded in two other months of the year, and the number of killed in one month only, while the number injured was exceeded in four months out of the twelve.

National Exposition of Railroad Appliances.

In another column we publish a circular, or what may be called a prospectus, of a national exposition of railroad appliances to be held in Chicago, beginning May 31, and to end about July 7, 1883. There are excellent names appended to this paper, and if the gentlemen who signed it will devote their time, energy and abilities to the exhibition, its success is assured.

There is ample material for an extremely interesting display of this kind, but there is equally ample room for doing a great deal of hard work in getting it up as it should be. Are the commissioners named ready to do this? On the answer to this inquiry the success of the project will depend.

Among other things to be done it is proposed that:

"A series of scientific and practical tests, to be made by well-known scientists and carefully selected committees, extending to every article and every description of material susceptible of reliable test, will constitute one of the most interesting as well as the most valuable features of the Exposition."

It may be said that if this plan be carried out as it should be, the advent of the millenium in industrial science is not far off. It is surprising how little conception some persons have of the difficulties in the way of doing such work, and of their ignorance of the fact that probably four-fifths of that which is done has no value. If the commissioners are able to secure the services of enough competent men to make a series of intelligent reports on the exhibits, they will probably do all that lies in their power. A list of prizes to be awarded is attended with some risks, which the commissioners would do well to anticipate before they commit themselves to the policy of offering them.

The opportunities, however, for such an exhibition as is contemplated are magnificent, and it only needs the exercise

of that kind of genius that some one has defined as "an infinite capacity of taking trouble" to make the project a great success.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Addison & Northern Pennsylvania.—Extended from Westfield, Pa., southwest to Gaines, 14 miles. Gauge, 3 ft.

Chicago, Burlington & Quincy.—The Joliet, Rockford & Northern Branch is completed from Serena, Ill., northwest to Paw Paw, 23 miles.

Chicago & Northwestern.—The Sioux River Branch is completed from Brookings, Dak., north to Castlewood, 34 miles.

Denver & New Orleans.—A branch is completed from the main line west to Colorado Springs, Col., 9 miles.

Jersey Shore, Pine Creek & Buffalo.—Track is laid from Stokesdale, Pa., southwest eighteen miles, an extension of 10 miles; also from Williamsport, Pa., northward 8 miles.

Milwaukee, Lake Shore & Western.—Extended from Monico, Wis., north to Rhinelander, 14 miles.

Minnesota Central.—Extended from Cannon Falls, Minn., eastward 11 miles.

Norfolk & Western.—Track on the New River Division is extended from Glenlynn, Va., north by west 21 miles.

Northern Pacific.—Extended westward to Livingston, Mon., 38 miles.

Owensboro & Nashville.—Extended from Bevier, Ky., south to Ricedale, 4 miles. Gauge, 5 ft.

Pensacola & Atlantic.—Extended from Chaffin, Fla., west to Ponce de Leon, 45 miles. Gauge, 5 ft.

Richmond & Mecklenburg.—Extended south by east to Chase City, Va., 6 miles. Gauge, 5 ft.

Rochester & Pittsburgh.—Track is laid on the Buffalo Division from Ashford, N. Y., northward 5 miles, and from Buffalo south by east 5 miles.

St. Paul, Minneapolis & Manitoba.—The Northern Division is extended from Grafton, Dak., north to Bathgate, 32 miles. The Hope Branch is completed from Ripon, Dak., northwest to Hope, 29 miles.

Woodstown & Swedesboro.—Completed from Swedesboro, N. J., southward to Oakland, 11 miles.

This is a total of 319 miles of new railroad, making 9,574 miles thus far this year, against 7,353 miles reported at the corresponding time in 1881, 5,624 miles in 1880, 3,445 miles in 1879, 2,207 miles in 1878, 1,877 miles in 1877, 2,177 miles in 1876, 1,237 miles in 1875, 1,767 miles in 1874, 3,507 miles in 1873, and 6,885 miles in 1872.

THE LAKE SUPERIOR IRON ORE PRODUCTION has this year been very much greater than ever before. For successive years the lake shipments from the several ports have been:

	1877.	1878.	1879.	1880.	1881.	1882.
Escanaba.....	38,743	506,893	755,274	1,163,791	1,438,042	1,727,458
Marquette.....	521,743	552,127	594,416	633,828	707,772	941,278
L'Anse.....	59,571	42,186	38,989	53,006	53,663	70,441
St. Ignace.....						5,167
Total.....	965,057	1,101,206	1,393,679	1,850,625	2,199,477	2,709,426

For 1881 and 1882 the shipments are given only till Nov. 22, and there were doubtless shipments for a week longer. There are also some through rail shipments, amounting last year to 60,966 tons.

It thus appears that the shipments this year have been 599,949 tons, or 27½ per cent., more than last year, 51½ per cent more than in 1880, 114½ per cent. more than in 1879, 155 per cent. more than in 1878 and 190 per cent. more than in 1877.

This is a rate of progress which has very rarely been equalled in any important industry, and is evidently altogether too fast to last. The cause of the rapid growth, however, has not been the growth of the iron industry alone, but the peculiar fitness of Lake Superior ore for the kind of pig iron recently most in demand—Bessemer pig especially. Iron production has increased greatly within the last three or four years, it is true, but not at the rate shown above for the Lake Superior ore production. The latter, in 1881, perhaps supplied something like one-third of the total iron manufactured in the United States.

Quite as remarkable as the great growth of the Lake Superior shipments is the change in the course of the shipments. In 1877 more than 54 per cent. of the whole went from Marquette, and less than 40 per cent. from Escanaba; this year 61½ per cent. went from Escanaba, and only 33½ per cent. from Marquette. This is due chiefly to the development of the Menominee iron mines; but Escanaba does not receive from these alone, but also and largely from the Marquette district. As all the shipments at Escanaba have to pass over some part of the Chicago and Northwestern Railway, we may imagine that the traffic contributes a very pretty sum to the earnings of that company; the effect on the growth of this traffic on the earnings of the Marquette, Houghton & Ontonagon has been shown by its monthly reports of earnings. For the ten months ending with October last its earnings were 83½ per cent. more than last year, and its earnings per mile in October were exceeded by only three roads out of 74 which reported for that month. This road may be said to live on iron ore, but some parts of the Northwestern have probably a still larger ore traffic, though, perhaps, not so great a traffic in supplies going to the mines.

St. Ignace makes its appearance for the first time as an ore-shipping port. It is the terminus of the new Detroit, Mackinaw & Marquette Railroad, on the Straits of Mackinaw. We believe there are no mines on its line, but that what it carries comes to it by way of Marquette. Shipments by this route escape the necessity of going through the St. Mary's Canal, or through "Death's Door" (the mouth of

Green Bay) and around the head of Lake Michigan. They are quite respectable for a first year.

The carriage of these vast shipments of iron ore, most of which go to Cleveland or some other Lake Erie port, has given employment to a great number of vessels which this year have not been able to secure cargoes of grain, and this has had an important effect in preventing the reduction of grain rates to the low figures which would have resulted had all the vessels competed for grain.

THE EFFECT OF THE RAILROAD WAR ON FREIGHT TRAFFIC we attempted to trace last week in the light of the wheat and flour receipts at Chicago and Milwaukee in the first week of the war, compared with those two weeks before, and were unable to find that any effect had been produced. As in that week perhaps only four days' shipments from Minneapolis and the other points from which the war rates are made had arrived at the lake ports, it might be said that it could not be expected to show the full effect of the war. But we have now reports or the second week of the railroad war, during every day of which there were receipts of freight shipped at the low rates. We give below these receipts for the first and second weeks of the railroad war, and also for the second week before the railroad war:

	Dec. 2.	Nov. 25.	Nov. 11.
Flour, bbls.:			
Chicago.....	137,489	132,402	134,802
Milwaukee.....	106,887	112,689	108,322
Both.....	244,376	245,091	243,124
Wheat, bu.:			
Chicago.....	416,410	549,536	840,121
Milwaukee.....	192,518	218,642	204,157
Both.....	608,928	768,178	1,044,278

Thus the second week of the railroad war no more than the first has shown any growth in the traffic most affected by the war rates. The flour receipts of the two lake ports were almost identically the same in all three of the weeks, one of which was a week before the war broke out. The wheat receipts have not only not increased but have fallen off largely. As the chief part of the Chicago wheat receipts may be from territory entirely south of that affected by the railroad war, we cannot say that the falling off there was not wholly in the receipts from the more southern territory. But at Milwaukee, which receives exclusively (substantially) from the territory served by the contending roads, there is no increase in either flour or wheat receipts, but a small decrease. The inference is inevitable that the low rates have not yet stimulated shipments to any extent. An expectation of the early restoration of rates would doubtless, however, make shipments as active as the stocks at stations and the cars available would permit.

But it is not altogether certain that even if holders were very anxious to ship there would be at this time a great increase in the movement. The railroad companies have not the equipment nor the force necessary to do six months' business in one. If traffic were dull elsewhere they could get plenty of cars from other roads, chiefly from the trunk lines east of Chicago, though not locomotives; but the trunk lines have about all they can do with their equipment just now, and cannot spare cars.

It has been intimated that the contending companies have been withholding cars required for the freight carried at low rates and using it elsewhere on their lines, and this has been spoken of as a sort of unfairness. But it is no more unfair to withhold cars from a shipper who pays \$24 for a car-load of wheat or flour carried 400 miles than from one who pays \$48, and if a company or a man cannot do all the work that is offered, we do not see why it is not as reasonable and natural and just for one as well as the other to do first what pays best.

THE PROPER TIME FOR BUILDING A SECOND TRACK becomes a practical question of much importance for the managers of the Canada Southern Railway, which after this year will have the whole through traffic of the Michigan Central. It seems to be assumed that a double track will soon be indispensable, because of the magnitude of the traffic. The amount of traffic, however, is only one of the elements which determine whether the danger point is reached on a single-track road. If very large trains can be run over it—that is, if it has easy grades and curves and is worked with very powerful locomotives—it may have fewer trains than many roads with a smaller traffic. If it has a simple traffic, very many more trains can be run than if there is a complex train service—some very fast passenger trains stopping seldom, and some way passenger trains, running slowly and stopping everywhere; through freight trains, way freight trains, always getting into the way or delaying some one, and suburban and other short-distance passenger trains. As nearly every great railroad in the country was once a single-track road, there have been numerous instances of the gradual growth of traffic, or rather of train service, till it could not be handled on one track. But it is wonderful what an enormous business has been done on some single-track lines, as at one time but a few years ago on parts of the Erie, and a little earlier on the 38 miles of the Chicago, Burlington & Quincy between Chicago and Aurora—both lines with many passenger trains and a very complex traffic.

But probably the most remarkable instance of a large and complex traffic carried over a long single-track road is that now offered by the Pittsburgh, Fort Wayne & Chicago Railway, of whose 468 miles of road only 69 have a double track, and until very recently not nearly so much as that. Over this road in 1881 there passed a traffic of 1,044 millions of ton-miles and 180 millions of passenger-miles, equivalent to 3,055 tons of freight and 381 passengers daily over the whole length of road. In 1880 the train service was 3,286,486 miles, and 22½ per cent. of it by passenger

trains, which is equivalent to 24 trains daily over the whole length of the roads. It has a large way freight and passenger traffic, a great number of junctions, and some very fast trains, which it is important to run on time, and which usually do run on time. Yet the road is very successfully worked, and the reported accidents are few. Compare this traffic with that of the Canada Southern, which last year was 1,656 tons of freight and 139 passengers and 9.4 trains each way daily over the entire mileage. The Canada Southern traffic, to be sure, was confined chiefly to 290 of its 403 miles of road; but if all were confined to this 290 miles the density of its traffic would still be very much less than the Fort Wayne's, and it is very much less complex, a larger proportion being freight, and very little of that local freight. Moreover there are very few junctions or crossings on the Canada Southern, and very many on the Fort Wayne.

It would seem, then, that with sufficient sidings and perhaps a double track between adjacent stations at a few places, and especially with great skill in train management the Canada Southern ought to be able to carry all the traffic which the Michigan Central can bring it for some years, without doubling its track.

CHICAGO RAIL SHIPMENTS EASTWARD for the nine days ending Nov. 30 were 76,275 tons, which is at the rate of 57,206 tons per week. For three years the shipments of this week have been:

	1880.	1881.	1882.
Tons.....	48,639	46,574	57,206

The shipments this year were thus 22½ per cent. more than last year and 17½ per cent. more than in 1880. The rate was \$5 per ton for grain and flour to New York this year, about \$2.50 last year, and \$7 in 1880—having been advanced from \$6 on Nov. 22 of that year. This makes the earnings from these shipments about at the rate of \$245 this year to every \$100 last year and \$292 in 1880.

Of the shipments of the last nine days of November this year 16.1 per cent. went by the Chicago & Grand Trunk, 27.1 by the Michigan Central, 18.9 by the Lake Shore, 16.6 by the Fort Wayne, 16 by the Pan-handle, and 5.3 per cent. by the Baltimore & Ohio. The two Vanderbilt roads thus had 46 per cent. of the whole, instead of the 45½ per cent. to which they are entitled, and the two Pennsylvania roads 32.6 per cent., instead of 35½ per cent.

The Chicago shipments for seven successive weeks have been:

	Oct. 14.	Oct. 21.	Oct. 28.	Nov. 4.	Nov. 11.	Nov. 18.	Nov. 25.
Tons.....	34,790	33,580	34,041	43,082	44,721	50,401	57,206

The shipments for the last week in November have never been exceeded in a fall week when rates were maintained, and were exceeded in the fall of last year when rates were but half as high only twice after September, and are the largest since Feb. 21 this year. They were, in fact, very large shipments for any time or any year. Probably they were stimulated somewhat by the announcement of the advance in rates Dec. 1, though heretofore there has not been usually a decrease, but often an increase, following the winter advance of rates.

For the week ending Dec. 2, the shipments billed at Chicago (not including those from points west billed to the East through Chicago), were 46,538 tons this year, against 46,954 tons in the corresponding week of last year, and 41,027 in the previous week of this year. These shipments are among the largest that have ever been made at this season, though in four days of the week lake navigation was open, and in two days the rates were advanced. Compared with last year there is an increase of 6,296 tons (10½ per cent.) in flour, a decrease of 5,193 tons (19½ per cent.) in grain, and of 1,521 tons (10½ per cent.) in provisions. A little later, when the corn begins to come forward freely, it will not be surprising if the shipments are the largest ever known in winter when rates were maintained.

THE NEW YORK, WEST SHORE & BUFFALO COMPANY, the completion of whose road between New York and Syracuse was before provided for and indeed in large part effected—seemed likely in the present condition of the money market to find difficulty in obtaining the capital to complete its road to Buffalo. It is now reported that negotiations were completed Dec. 1 with Winslow, Lanier & Co., representing a syndicate of European and American bankers, by which \$20,000,000 of the company's first-mortgage 5 per cent. bonds will be taken at 74 and accrued interest, payable in installments as required. This, it is said, will enable the company to complete the road to Buffalo, provide \$2,000,000 worth of rolling stock (in addition to \$4,000,000 already appropriated for that purpose), and a reserve of cash sufficient to pay interest during construction and for some time afterward. An enormous expenditure has already been made on the road, apparently neither pains nor expense being spared to make it as efficient and economical a carrier as is possible in the present stage of the art of railroading, which is necessary if it is to succeed, competing, as it will, at nearly every station, with the Hudson River and the Erie Canal and the New York Central & Hudson River Railroad. There is thus the more reason to complete the road as soon as possible, because thus only can the great expenditure already made be fully utilized.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:
Virginia Midland, annual meeting, at the office in Alexandria, Va., Dec. 20.

Cleveland & Pittsburgh, annual meeting in Cleveland, O., Jan. 3.
Richmond & Danville, annual meeting, in Richmond, Va. Dec. 13.

Dividends.

Dividends have been declared as follows:

Evansville & Terre Haute, 6 per cent., payable Jan. 1, 1883. Transfer books close Dec. 15.
New York, Lake Erie & Western, 6 per cent. on preferred stock for the year ending Sept. 30 last, payable Jan. 16, 1883. Transfer books close Dec. 30.
Union Pacific, 1½ per cent., quarterly, payable Jan. 2, 1883. Transfer books close Dec. 9.
Fitchburg, 3 per cent., semi-annual, payable Jan. 1. Transfer books close Dec. 14.

Foreclosure Sales.

The Dorchester & Delaware road, which was withdrawn from sale recently because no adequate bid was made, will be again offered at public sale Jan. 3, 1883, in Cambridge, Md. The road extends from Cambridge to the Delaware line, 28 miles. It is said that the Philadelphia, Wilmington & Baltimore Company has made an arrangement with the bondholders, by which they will make no bid for the road, but permit it to be bought by that company.

Western Association of General Passenger and Ticket Agents.

There will be a special meeting of this Association on Tuesday, Dec. 12, 1882, at the New Denuison House, Indianapolis, Ind., at 10 o'clock a. m. This meeting is called for the purpose of a general revision of basing and other rates, and each line in the territory is urgently requested to have a representative present.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The following circular is dated Dec. 1: "Mr. J. F. Goddard has this day been appointed Traffic Manager of this company, and will have charge of all its commercial business. His authority will extend over the Atchison, Topeka & Santa Fe Railroad and leased lines; also over the New Mexico & Arizona Railroad, the Sonora Railway (leased), and the Leavenworth, Topeka & Southwestern Railway. Heads of commercial departments will report directly to him and will be governed by his instructions." Mr. Goddard has been General Freight Agent of the road for six years, and was previously on the Chicago, Burlington & Quincy. It is understood that Mr. H. C. Barlow, for some time assistant to Mr. Goddard, will succeed him as General Freight Agent.

At a meeting of the board in Boston, Dec. 6, Mr. E. A. Touzalin was chosen Vice-President. Mr. Touzalin was for many years with the Chicago, Burlington & Quincy, and recently resigned his position as a Vice-President of that company.

Boston, Clinton, Fitchburg & New Bedford.—At the annual meeting, Dec. 5, the following directors were chosen: Charles Burleigh, Wm. W. Crapo, Charles T. Crocker, Lyman Nichols, John Reed, Wm. J. Rotch, Royal E. Robbins, John E. Sanford, E. V. R. Thayer, Nathaniel Thayer, Jr., George A. Torrey. The road is leased to the Old Colony Company.

Chesapeake & Delaware Canal.—At the annual meeting in Philadelphia, Dec. 5, the following were chosen: President, Andrew C. Gray; directors, Charles H. Hutchinson, John F. Gilpin, I. V. Williamson, Edwin Swift, Mahlon F. Hutchinson, John R. Baker, Gustavus S. Benson, Henry C. Ford, Joseph E. Gillingham, Robert M. Lewis, W. Drayton, Charles Chaucey, Edwin N. Benson, H. Pratt McKean.

Chicago & Northwestern.—Mr. Oscar F. Bell has been appointed Pool Secretary, a new office. He will have charge of all records and accounts relating to pools, and rates between pooled points, and will direct the issue of rates, notices and tariffs governing pooled points. Correspondence respecting pool matters should be referred to him.

East Tennessee, Virginia & Georgia.—Mr. T. W. Garrett is appointed Master of Trains of the East Tennessee Division, appointment to take effect Dec. 1.

Houston & Texas Central.—Mr. A. C. Hutchinson, of New Orleans, has been chosen President in place of Charles A. Whitney, deceased. Mr. Hutchinson has been for several years Vice-President of Morgan's Louisiana & Texas Company.

Lehigh Valley.—Mr. Robert H. Sayre, Superintendent and Engineer, having resigned, the office has been divided. Mr. H. Stanley Goodwin has been appointed Superintendent, and Mr. E. C. Steadman, Chief Engineer. Mr. Goodwin has been Assistant Superintendent for several years, and Mr. Steadman has been Engineer in charge of the main line.

Louisville & Nashville.—The following circular has been issued: "Taking effect Dec. 1, Mr. F. P. Huston is appointed Purchasing Agent of this company, vice Mr. Gilbert C. Breed. Mr. Huston will continue in charge of the Stationery Department, as Stationery Supply Agent. Office, 143 Main street, Louisville, Ky."

Minneapolis & St. Louis.—A circular from this company announces the following appointments under date of Nov. 27:

"Mr. H. A. Towne having resigned as Superintendent of Machinery, Mr. George F. Wilson is appointed Master Mechanic, in charge of Locomotive and Car Department, taking effect Dec. 1. Mr. W. A. Young is appointed Superintendent of Telegraph and Chief Train Dispatcher. He will have full charge of telegraph lines, agents and operators, and direct in regard to the movement of trains and distribution of cars."

"Mr. J. Burns' authority as Train-Master is extended over the whole line, with headquarters at Minneapolis. Mr. H. S. Holla is appointed Assistant Train-Master on Second and Third divisions, with headquarters at Ft. Dodge. All train orders will be given in Train-Master's name, signature J. B."

New Orleans & Northeastern.—This company has elected E. M. Johnson, President; John Scott, Vice-President and General Manager; W. Dunstan, Secretary and Treasurer. Mr. Johnson succeeds Frederick Wolfe, resigned.

New York & New England.—At the annual meeting in Boston, Dec. 5, the following directors were chosen: Eustace C. Fitz, Jonas H. French, Wm. F. Hart, Henry L. Higginson, James H. Wilson, Boston; W. F. Sayles, Saylesville, R. I.; Jesse Metcalf, Providence, R. I.; W. E. Barrows, Williamantic, Conn.; Wm. B. Franklin, Hartford, Conn.; George M. Landers, New Britain, Conn.; Frederick J. Kingsbury, Waterbury, Conn.; Legrand B. Cannon, Sidney Dillon, Cyrus W. Field, R. Suydam Grant, Jay Gould, Hugh J. Jewett, Russell Sage, New York; George B. Roberts, Philadelphia. The only new director is Gen. Franklin, who is added to the board.

Northern Central.—Mr. Wm. H. Joyce has been ap-

pointed Division Freight Agent of the Baltimore Division, to date from Dec. 1.

Mr. Samuel L. Seymour has been appointed Division Freight Agent of the Susquehanna, Shamokin and Elmira & Canandaigua divisions, to date from Dec. 1.

Northern Pacific.—The following circular from Mr. G. W. Cushing, Superintendent of Motive Power, is dated St. Paul, Dec. 1:

"Mr. H. J. Small, heretofore Acting Master Mechanic of the Minnesota Division and branches, is appointed Assistant to the Superintendent of Motive Power, Machinery and Rolling Stock, with headquarters at Brainerd, Minn., and in his absence will so act under title of Assistant Superintendent Machinery, Eastern Division."

Northwestern Traffic Association.—Mr. E. F. Lalk has been appointed Auditor of this Association and the Central Iowa Traffic Association. He has been for some time Chief Clerk to Commissioner Carman.

Oregon Railway & Navigation Co.—Mr. E. A. Brown is appointed Train Dispatcher of the Narrow Gauge Division, with office at Ray's Landing, Or., in place of F. W. Smith, resigned.

Palouse & Columbia River.—This company has elected C. H. Prescott, President; C. H. Smith, Vice-President; H. M. Chase, Treasurer; Joseph Simon, Secretary; W. H. Upton, Assistant Secretary.

Pittsburgh & Connellsville.—At the annual meeting in Pittsburgh, Dec. 4, the following directors were chosen: George A. Berry, W. J. Bissell, C. L. Fitzhugh, John D. Scully, Pittsburgh; Wm. Baldwin, Connellsville, Pa.; W. A. Koontz, Somerset, Pa.; C. C. Markle, West Newton, Pa.; W. H. Markle, Greensburgh, Pa.; Mendes Cohen, Robert Garrett, Hugh Sisson, Charles Webb, Baltimore. The board re-elected Robert Garrett, President; J. B. Washington, Secretary and Treasurer. The road is leased to the Baltimore & Ohio Company.

Rochester & Pittsburgh.—Mr. J. Emery is appointed Assistant General Passenger Agent, with office in Rochester, N. Y.

Seneca Lake Steam Navigation Co.—Mr. W. B. Dunning has been chosen Superintendent, Secretary and Treasurer, and will have his office in Geneva, N. Y. Mr. George S. Prince is General Ticket Agent.

South & North Alabama.—This company has elected J. W. Sloss, President; Milton H. Smith, Vice-President; Henry M. Bush, Secretary and Treasurer. The road is worked by the Louisville & Nashville Company.

Texas & St. Louis.—Mr. A. E. Buchanan has been appointed Superintendent of the North Arkansas Division. He was recently Superintendent of Bridges on the St. Louis, Iron Mountain & Southern road.

Union Pacific.—Mr. M. H. Goble, late Freight Auditor, is appointed General Purchasing Agent, in place of A. D. Clarke, resigned.

Wilmington, Columbia & Augusta.—At the annual meeting in Wilmington, Nov. 21, the following directors were chosen: H. B. Short, Columbia, S. C.; R. R. Bridges, Wilmington, N. C.; J. Don Cameron, Harrisburg, Pa.; George S. Brown, George C. Jenkins, B. F. Newcomer, Elmhurst, Ill.; Samuel M. Shoemaker, William F. Walters, Baltimore; H. B. Plant, New York. The board re-elected R. R. Bridges, President; William F. Walters, Vice-President.

Wilmington & Weldon.—At the annual meeting in Wilmington, Nov. 21, the following directors were chosen: A. J. de Rosset, Donald McRae, R. R. Bridges, Wilmington, N. C.; E. B. Borden, Goldsboro, N. C.; George Howard, Tarboro, N. C.; W. H. Willard, Raleigh, N. C.; B. F. Newcomer, Samuel M. Shoemaker, H. Walters, William F. Walters, Baltimore; H. B. Plant, New York. The board re-elected R. R. Bridges, President; B. F. Newcomer, Vice-President.

PERSONAL.

—Dr. John Edmund Bacon, a physician and prominent citizen of Columbus, Ga., died in that city Nov. 19, aged 70 years. He was actively concerned in many local enterprises and has served as Mayor of that city. He was father of Major R. A. Bacon, Secretary of the Georgia Railroad Commission.

—Mr. W. G. Swan, Traffic Manager of the Chicago, Milwaukee & St. Paul, has taken leave of absence, and will go to California for the benefit of his health.

—Mr. A. D. Clarke has resigned his position as General Purchasing Agent of the Union Pacific road, and will devote his time to the management of large mining interests which he controls.

—Mr. W. C. Burke, Resident Engineer of the Texas & St. Louis road, and lately in charge of the building of the bridge over Red River, has resigned, to accept a position on the Atchison, Topeka & Santa Fe road.

—It is reported that Mr. D. W. Caldwell, now Vice-President of the New York, Chicago & St. Louis and formerly General Manager of the Pittsburgh, Cincinnati & St. Louis, will be appointed Vice-President of the East Tennessee, Virginia & Georgia Company, and will be the chief executive officer of that company.

—Hon. Henry C. Murphy, a prominent lawyer and citizen of Brooklyn, N. Y., died in that city, Dec. 1. He had served in Congress, in the State Senate, as Mayor of the city, and in other public positions. At the time of his death he was President of the Brooklyn, Flatbush & Coney Island Company, a director of the Brooklyn City Railroad Company and the Union Ferry Company and President of the board of trustees of the East River Bridge.

—Mr. W. G. Raoul has resigned his position as Vice-President of the Central Railroad & Banking Company, of Georgia. It is understood that Mr. Raoul is making an active canvass for the election to the presidency of the company at the annual meeting next month. He represents the interest of the late President Wadley and of those who were allied with him and supported his policy, as opposed to the Louisville & Nashville interest, which is represented by Gen. B. P. Alexander, who was chosen President on Mr. Wadley's death.

—Gen. Daniel Tyler died at the Fifth Avenue Hotel in New York, Nov. 30, aged 83 years. He graduated from West Point in 1819, and was the oldest living graduate at the time of his death. He served in the army as a lieutenant of artillery till 1834, when he resigned and became a civil engineer, soon taking important positions. From 1840 to 1844 he was President of the Norwich & Worcester Railroad Company; from 1844 to 1846 of the Morris Canal Company, and from 1846 to 1848 of the Macon & Western Railroad Company. Later he served successively as Superintendent and Engineer of the Cumberland Valley road; General Superintendent of the Dauphin & Susquehanna; Chief En-

gineer and afterwards President of the Schuylkill & Susquehanna. At the beginning of the late war Gen. Tyler was appointed Colonel of the First Connecticut Regiment and afterwards Brigadier General. After the war he spent much of his time in the South, where he acquired large interests in coal lands and in iron and other manufacturing property in Alabama. In 1873 he was chosen President of the Mobile & Montgomery Company, then just reorganized, and held that position for five years.

TRAFFIC AND EARNINGS.

Rates to Ohio River Points.

The following circular has been issued by Commissioner Pink:

"In compliance with the joint request of the general freight agents of the Chesapeake & Ohio, Scioto Valley, and Columbus, Hocking Valley & Toledo railways, the following resolution was adopted at a meeting of the Trunk Line Sub-Executive Committee held Tuesday, Nov. 28, 1882:

"Resolved, That commencing Friday, Dec. 1, 1882, the basis for west-bound rates to points on the Ohio River between Pomeroy and Ironton, Ohio, inclusive, namely, Pomeroy, Middleport, Cheshire and Gallipolis, Ohio, Charleston and Huntington, W. Va., Petersburg, Ohio, Ashtabula, Ky., and Ironton, Ohio, will be 3 cents per 100 lbs. above the rates to Columbus, Ohio, on first, second and third classes, and 2 cents per 100 lbs. above on fourth class."

Railroad Earnings.

Earnings for various periods are reported as follows:

Eleven months ending Nov. 30:	1882	1881.	Inc. or Dec.	P. c.
Chi. & N. W.	\$21,933,031	\$19,916,754	I.	\$2,016,277 10.1
Denver & R. G.	5,906,858	5,353,780	I.	553,078 10.3
Hann. & St. Jo.	2,063,550	2,062,907	I.	643 0.2
Ind. Bloom. & W.	2,436,251	2,294,947	I.	141,304 6.2
Long Island.	2,143,150	1,837,846	I.	305,304 16.6
Louis & Nash.	11,750,479	10,184,058	I.	1,566,421 15.3
Mil. L. S. & W.	809,567	558,383	I.	251,184 44.8
Metrop. Ede.	2,485,192	2,294,529	I.	190,663 8.3
Mo. Pacific lines:				
Central Branch.	875,917	881,682	D.	6,765 0.8
Int. & Gt. No.	2,917,719	2,481,946	I.	435,773 18.5
Mo., Kan. & T.	5,755,087	4,930,437	I.	824,650 16.5
Mo. Pacific.	7,301,524	6,070,748	I.	1,230,776 20.1
St. L. I. M. & S.	6,800,330	6,628,104	I.	172,226 2.6
Tex. & Pacific.	4,502,127	3,570,354	I.	921,773 25.9
Mobile & Ohio.	1,876,135	2,144,408	D.	268,273 12.5
N. Y. Elevated.	3,054,277	2,664,575	I.	389,702 14.3
Northern Pacific.	3,466,082	3,720,489	I.	745,583 20.1
St. L. & San Fran.	2,872,319	2,872,319	I.	371,000 12.9
Union Pacific.	27,090,936	24,866,154	I.	2,224,782 8.5
Wab. St. L. & P.	15,406,416	13,133,120	I.	2,273,296 17.3
Ten. Months Ending Oct. 31:				
Cleve., Col., Cin. & Ind.	\$3,516,606	\$3,655,874	D.	\$139,268 3.8
Month of September:				
Gal. H. & San A.	\$200,696	\$135,990	I.	\$64,706 47.6
Net earnings.	128,637	81,291	I.	47,346 58.2
Month of October:				
Cleve., Col., Cin. & Ind.	\$415,898	\$398,274	I.	\$17,624 4.4
Houston & T. Cen.	442,500	371,634	I.	70,866 19.0
Louisv. & Nash.	1,215,000	1,002,950	I.	212,050 21.1
Net earnings.	503,322	419,460	I.	83,862 20.0
Mildand N. Car.	16,151	.....	.....	.....
Net earnings.	8,312	.....	.....	.....
Rome, Wat. & Oge.	172,737	.....	.....	.....
Net earnings.	67,155	48,791	I.	18,364 27.5
Month of November:				
Chi. & Northwest.	2,069,500	2,019,900	I.	50,500 2.5
Denver & R. G.	512,965	547,055	D.	34,090 6.2
Hann. & St. Jo.	249,225	195,619	I.	53,606 27.4
Ind. Bloom. & W. ....	.....	.....	.....	.....
West.	256,998	200,451	I.	56,547 28.2
Long Island.	170,773	141,335	I.	29,438 20.9
Louisv. & Nash.	1,197,748	1,058,698	I.	139,050 12.1
Metrop. Elevated.	215,665	228,592	D.	12,927 5.6
Mil. L. S. & W.	78,518	57,540	I.	20,978 26.5
Mo. Pacific lines:				
Central Branch.	128,864	80,387	I.	48,477 60.5
Int. & Gt. No.	370,378	303,003	I.	67,375 22.2
Mo., Kan. & Tex.	694,190	533,957	I.	160,242 30.9
Mo. Pacific.	781,958	550,409	I.	231,549 51.9
St. L. I. M. & So.	843,973	867,271	I.	156,702 22.8
Tex. & Pacific.	619,356	369,521	I.	250,135 67.6
Mobile & Ohio.	295,110	192,986	I.	102,124 12.2
N. Y. Elevated.	315,874	259,449	I.	56,425 27.8
Northern Pacific.	761,324	475,611	I.	285,713 60.0
St. L. & San Fran.	331,300	284,300	I.	47,000 16.6
Union Pacific.	2,821,070	2,723,698	I.	97,462 3.6
Wab. St. L. & P.	1,525,715	1,343,557	I.	182,158 13.6
Third week in November:				
Chi. & Alton.	\$200,538	\$165,590	I.	\$34,942 21.0
Chi. & East. Ill.	46,326	34,673	I.	11,653 33.0
Chi. & Gd. Trunk.	55,005	31,988	I.	23,017 73.5
Ft. & P. Marq.	47,802	38,001	I.	9,801 25.8

New Live Stock Rates.

Rates on live stock and dressed beef went into effect Dec. 1 as follows, in cents per 100 lbs., the rates from other places than Chicago being the usual percentages of the Chicago rates:

	Cattle.	Hogs.	Horses, mules and sheep.	Dressed beef.
To Erie.	22	18	25	27½
To Dunkirk.	25	19	27½	30
To Buffalo, S. Bridge, Pittsburgh, Wheeling and Bellaire.	32½	20	32½	35
To Albany.	51	32	52	59
To Baltimore.	57	32	57	61
To Philadelphia.	58	33	58	62
To New York.	60	35	60	64
To Boston.	60	35	60	64

The minimum car-load at these rates is 19,000 lbs. for cattle, 16,000 for single deck and 22,000 for double-deck cars for hogs, 14,000 for single-deck and 18,000 for double-deck cars for sheep, and 20,000 lbs. for horses.

Grain Movement.

For the week ending Nov. 25 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past nine years:

Year.	Northwestern receipts.	Total.	By rail.	By water.	Atlantic receipts.
1874.	359,732	858,113	414,044	48.3	2,017,561
1875.	3,188,546	1,917,619	1,267,584	66.1	3,028,624
1876.	2,645,154	1,733,999	1,376,625	79.4	3,883,986
1877.	3,101,359	1,862,943	514,990	27.7	5,480,035
1878.	4,678,731	2,919,174	1,012,737	34.7	5,740,942
1879.	3,865,035	2,182,321	535,928	24.5	4,641,486
1880.	4,388,767	2,004,368	1,219,063	62.8	5,858,862
1881.	2,564,428	2,036,895	1,351,275	66.3	3,974,367
1882.	4,866,926	3,269,096	2,071,628	63.1	4,601,377

The receipts of the Northwestern markets for the week were thus larger this year than in the corresponding week of any previous year, and 90 per cent. more than last year. This is the time when receipts usually fall off smartly, in view of the approaching close of navigation, but this year the receipts are larger than the week before.

The shipments of these markets were also larger than in the corresponding week of any preceding year, and 60 per cent. more than last year. The rail shipments were also

50 per cent. more than last year. The total shipments were, however, the smallest since the middle of July, the falling off being in lake shipments, which is usual at this season. The shipments down the Mississippi for the week were 134,146 bushels, or 4.1 per cent. of the whole.

The Atlantic receipts were 16 per cent. more than in the corresponding week of last year, but smaller than in any other since 1876. They were, however, larger than in any previous week of this year since the middle of September—a course of things almost unprecedented.

Of the Northwestern receipts for the week Chicago had 43.8 per cent., St. Louis 22.3, Peoria 11, Milwaukee 10.2, Toledo 8.6, Detroit 4, and Cleveland 0.1 per cent. This was the first week of the railroad war, which favored Chicago and Milwaukee, and some of the other markets, but the gain at St. Louis over the previous week was 332,000 bushels; at Chicago and Milwaukee together, 289,000 bushels. The whole gain is in corn, which was received largely at St. Louis and Peoria, indicating the beginning of the movement of the new crop, which is in perfect condition for distilling and immediate feeding, for which latter purpose vast quantities are required in all cities and towns, west as well as east.

Of the Atlantic receipts for the week, New York had 65.6 per cent., Baltimore 9.7, New Orleans 8, Boston 7.7, Philadelphia 6.5, Montreal 1.7, and Portland 0.8 per cent.

The increase over the previous week is at New Orleans and New York. Montreal is about to cease receiving for the winter, and Portland begins to get enough to be worth chicaning.

Of the exports this week (1,957,387 bushels) New York shipped 54.5 per cent., Montreal 15.6, Baltimore 11.5, Philadelphia 8.6, Boston 6.7, and New Orleans 3.1 per cent.

For the week ending Nov. 29 the exports this year were 1,874,978 bushels of grain and 174,215 barrels of flour, against 2,196,395 bushels and 68,197 barrels in 1881 and 8,203,963 bushels and 101,826 barrels in 1880.

For the week ending Dec. 2 receipts and shipments at Chicago and Milwaukee were:

	1882.	1881.	1882.	1881.
Chicago.....	2,527,357	1,671,800	1,400,079	1,244,790
Milwaukee.....	518,249	402,025	185,934	133,736

Both..... 3,045,606 2,073,825 1,585,993 1,378,526

The receipts were nearly 50 per cent., the shipments only 15 per cent. greater than last year.

For the week ending Dec. 2 receipts and shipments at Buffalo were:

	Receipts.	Shipments.	1882.	1881.	1882.	1881.
By rail.....	811,500	344,900	884,740	656,500		
By lake.....	814,888	447,000	1,615,609			
Total.....	1,626,388	791,900	2,600,349	656,500		

The receipts this year were more than twice as great as last year, and the rail receipts 135 per cent. greater. The shipments were nearly four times as great as last year, when there were none by canal, but the rail shipments were 50 per cent. greater this year.

For the week ending Dec. 2 receipts for Eastern ports have been, for three years:

Bushels:	New York.	Boston.	Phila.	Baltimore.	Total.
1882.....	3,111,146	383,400	239,300	589,811	4,353,657
1881.....	1,582,236	457,074	202,150	389,339	2,630,799
1880.....	2,074,239	478,006	549,100	1,144,033	4,245,378
P. c. of total:					
1882.....	71.4	8.8	6.2	13.6	100.0
1881.....	60.1	17.4	7.7	14.8	100.0
1880.....	48.9	11.3	12.9	26.9	100.0

Philadelphia and Baltimore together had 19.8 per cent. of the whole this year, against 22.5 per cent. last year and 39.8 in 1880. Of the New York receipts 1,657,094 bushels (58½ per cent. of the whole) arrived by rail this year, against 838,214 (53 per cent.) in 1881, and 1,378,041 (66½ per cent.) in 1880. At the rates current the earnings from the rail receipts at New York must have been about at the rate of \$395 this year for every \$100 in 1881.

Buffalo grain receipts this year to Nov. 30 are reported as follows, flour in barrels and grain in bushels:

	Flour.	Grain.	1882.	1881.	1882.	1881.
By lake.....	1,791,373	952,033	48,546,943	56,229,941		
By rail.....	614,965	830,400	23,063,700	29,881,200		
Total.....	2,406,338	1,782,433	71,610,643	86,111,141		
P. c. by rail.....	25.6	46.6	32.2	34.7		

Increase in flour, 623,885 barrels, or 35.0 per cent.; decrease in grain, 14,500,498 bushels, or 16.8 per cent. The increase in flour receipts is notable, especially the largely increased flour receipts by lake.

Shipments eastward of grain received by lake for the same period were as follows, in bushels:

	1882.	1881.	Decrease.	P. c.
By canal.....	20,683,880	31,104,254	1,420,374	4.5
By rail.....	11,502,075	21,272,356	9,770,281	46.0
Total.....	41,185,955	52,376,610	11,190,655	21.4

The canal opened April 11 this year and May 17 in 1881. This year up to Nov. 30 there were 6,571 boats cleared and \$351,364 tolls received, against 6,294 boats cleared and \$326,151 tolls received at the corresponding time last year. The average receipts of tolls per day were \$1,422 this year and \$1,656 last year, a decrease of \$234, or 14.1 per cent.

San Francisco exports for the five months of the California crop year from July 1 to Nov. 30, were as follows, flour in barrels and wheat in bushels, flour being reduced to wheat in the totals:

	1882.	1881.	Inc. or Dec.	P. c.
Flour.....	459,746	317,953	141,793	44.6
Wheat.....	12,564,568	16,175,862	3,611,294	22.3
Total, bushels.....	14,863,298	17,705,627	2,842,329	16.3

Shipments of California barley by sea for the five months ending Nov. 30, were 156,910 centals, against 67,576 centals last year, an increase of 89,334 centals, or 132.2 per cent.

Crops.

The November report of the Department gives the average yield of corn per acre this year as 25 bushels, against 18 bushels in 1881, 28.1 in 1880, and 1879, and an average of nearly 27 from 1870 to 1880, and the aggregate crop 1,640,000,000 bushels, against 1,195,000,000 last year, 1,719,000,000 in 1880, and 1,754,000 in 1879.

The returns concerning the cotton crop so far received indicate an aggregate yield of about 6,750,000 bales of 450 lbs., which is equal to the crop of 1880—the largest one hitherto.

Coal Movement.

Coal tonnages for the week ending Nov. 25 are reported as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Anthracite.....	700,020	348,707	351,313	100.7
Semi-bituminous.....	130,171	105,340	24,831	23.6
Bituminous, Penna.....	61,442	56,772	4,670	8.2
Coke, Pa.....	66,278	44,525	21,753	48.8

The total tonnage of anthracite this year to Nov. 25 was 26,359,204 tons, an increase of 1,151,240 tons, or 4.6 per cent., over last year. The anthracite trade is now very quiet, and only a long cold spell can strengthen it.

Semi-bituminous coals are scarce at tide-water, and the market is firm.

The coal tonnage of the Lehigh Valley Railroad for the fiscal year ending Nov. 30 was as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Anthracite.....	6,257,159	5,791,376	465,783	8.0
Bituminous.....	78,982	79,325	343	0.4

Total..... 6,336,141 5,870,701 465,440 7.9

Of the anthracite coal 1,322,712 tons were from the Wyoming Region; 2,919,219 tons from the Hazleton Region; 588,159 tons from the Beaver Meadow Region; 1,477,069 tons from the Mahanoy Region; total, 6,257,159 tons.

The coal tonnage of the New York state canals from the opening to Nov. 30 was:

	1882.	1881.	Inc. or Dec.	P. c.
Anthracite.....	1,024,477	886,560	138,917	15.6
Bituminous.....	169,115	204,553	35,438	17.3

Total..... 1,193,592 1,091,113 102,479 9.4

The canals opened April 11 this year, and May 17 last year.

Cumberland coal shipments for the week ending Nov. 25 were 60,880 tons. The total shipments this year to Nov. 25 were 1,281,111 tons.

The coal tonnage of the Pennsylvania Railroad for the week ending Nov. 25 was: Coal, 1,161,584; coke, 56,278; total, 1,217,862 tons. The total tonnage this year to Nov. 25 was 9,967,317 tons.

The approximate tonnage of the Philadelphia & Reading Company for the fiscal year ending Nov. 30 was as follows:

	1882.	1881.	Increase.	P. c.
Tons coal carried by railroad.....	8,430,000	8,072,142	357,858	4.4
Tons coal mined:				
By Coal & Iron Co.....	4,108,035	3,937,607	170,428	4.3
By tenants.....	1,520,440	1,484,993	35,447	2.4

Total..... 5,628,475 5,422,600 205,875 3.8

The tonnage mined from the Coal & Iron Company's estate was last year 66.8 per cent. of that carried over the railroad. That is, the Coal & Iron Company furnished the railroad company with two-thirds of its coal tonnage for the year.

Cumberland coal tonnages from the mines are reported as follows by the Cumberland *Citizen* for the eleven months ending Dec. 2:

Cumberland & Pennsylvania R. R.....	910,663
George's Creek & Cumberland.....	175,761
West Virginia Central & Pittsburgh.....	235,388

Total..... 1,321,812

There are also small shipments from some of the mines direct to the Baltimore & Ohio road. Shipments away from the region for the eleven months were as follows:

Baltimore & Ohio R. R.....	909,277
Bedford Div., Pennsylvania R. R.....	156,609
Chesapeake & Ohio Canal.....	267,272

Total..... 1,333,158

The total production reported this year is 1,342,403 tons.

Anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the eleven months ending Dec. 2 were:

	1882.	1881.	Increase.	P. c.
Coal Port for shipment.....	100,397	78,756	21,641	27.4
S. Amboy for shipment.....	673,316	607,935	65,381	10.7
Local points on N. J. lines.....	603,331	670,198	66,867	3.8
Co.'s use on N. J. lines.....	120,872	105,541	15,331	14.5

Total..... 1,589,916 1,462,430 127,486 8.7

Of the total this year 1,332,008 tons were from the Lehigh Region, and 257,913 tons from the Wyoming Region.

Lake Superior Iron Ore.

Shipments of iron ore from the Lake Superior Region up to Nov. 29 are reported as follows by the Marquette *Mining Journal*:

	1882.	1881.	Increase.	P. c.
L'Anse.....	70,543	53,063	17,480	32.4
Marquette.....	944,550	711,609	232,941	32.7
Escanaba.....	1,735,259	1,459,815	275,444	18.9
St. Ignace.....	60,159	60,159		

Total..... 2,810,511 2,225,087 585,424 26.3

Of the Escanaba shipments 647,050 tons were from the Marquette District and 1,088,209 tons from the Menominee District.

Besides the ore reported from Marquette there were 5,595 tons of quartz shipped and 93,457 tons of ore delivered to local furnaces.

Pig iron shipments were 11,126 tons from Marquette and 3,355 tons from St. Ignace, 14,481 tons in all.

Besides the ore reported shipped from St. Ignace, the Detroit, Mackinac & Marquette road carried 1,620 tons of quartz to that point for shipment, and 22,427 tons of ore to local furnaces.

The Northwestern Railroad War.

The meeting in Chicago, Dec. 2, resulted in nothing, and an adjournment was taken to Dec. 8, in New York. The Chicago dispatches state that President Porter, of the Chicago, St. Paul, Minneapolis & Omaha, refused to entertain any proposition for the maintenance of rates or for the division of business until a settlement of the question of territory could be secured and some agreement reached which would prevent the construction of new lines and branches into territory already occupied by other companies.

With the exception of this conference there has been little or nothing new in relation to the war.

The following has been published as an authoritative expression of Mr. Porter's views: "If the St. Paul road or its construction companies build new lines to points in the territory of the St. Paul & Omaha road, thus making such points competitive, the St. Paul & Omaha line will protect its business at the best obtainable rates, and will decline to pool any business from any point with the St. Paul road. Mr. Porter has no objection whatever to the building of legitimate and necessary lines, but does object to railroads being built by construction companies in the interest of Milwaukee & St. Paul officials and directed into territory where no second line is needed, and where there is not business enough to support even one line, and afterward selling such new lines to the Chicago, Milwaukee & St. Paul Company at an immense profit over their cost, and then demanding that such competitive business be pooled. Such indiscriminate building of railroads is of no benefit to the country; on the other hand, is a positive injury; it destroys the confidence of people in railroad securities, and ultimately brings with it financial disasters, panics, etc., and at the same time necessarily increases the cost of transportation."

A Chicago dispatch on the 4th stated that the Illinois Central had given notice of its intention to make the rates between Chicago and Omaha by way of Sioux City 15 cents per 100 lbs., unless something was done at once to restore rates generally.

The Chicago Lumber Pool.

A dispatch from Chicago, Dec. 6, says: "The general freight agents of the roads running to Missouri River points met here to-day to form a lumber pool to those points. The question came up whether a single pool should be made to

all points or whether it should be divided into two divisions—north and south—and, after discussion, it was decided to refer the matter to the general managers for decision. The meeting then adjourned until the 20th inst."

THE SCRAP HEAP.

Locomotive Building.

The Baltimore & Ohio shops at Mount Clare, Baltimore, in the year ending Sept. 30 last, built 29 new engines, 19 of them being consolidation engines with 20 by 24 in. cylinders and 50 in. drivers; nine passenger engines, with 19 by 24 in. cylinders and 69 in. drivers, and one a yard engine, with 17 by 24 in. cylinders and 50 in. drivers.

The first engine from the new New York Locomotive Works in Rome, N. Y., was run out of the erecting shop Nov. 29, and was to be shipped this week.

The Louisville & Nashville shops in Louisville, Ky., are building a new passenger engine for the road.

The Portland Co., in Portland, Me., has a contract to build 40 engines for the Northern Pacific road.

The order given by the Pennsylvania Railroad to the Grant Locomotive Works in Paterson, N. J., is for 45 engines, to be built to the Pennsylvania specifications.

The Brooks Locomotive Works in Dunkirk, N. Y., have received an order for 10 freight engines for the Lake Erie & Western road.

Car Notes.

The LaFayette Car Co. at LaFayette, Ind., is running on a heavy contract for box and flatcars for the New York, Chicago & St. Louis road.

The Michigan Car Co. in Detroit has lately completed 100 Tiffany refrigerator cars for the Great Eastern Line and 100 for the Grand Trunk road.

The Ohio Falls Car Co. in Jeffersonville, Ind., have lately completed 200 freight cars for the Cincinnati, Hamilton & Dayton road. They are furnished with Butler's draw-bar, buffer and spring-protector, which was submitted to very severe tests while these cars were in the shops. This company has built an experimental box car to carry 30 tons. It weighs 28,300 lbs., the axles have 4 by 8 in. journals, and the truck is of the "Cleveland" pattern.

The Jeffersonville, Madison & Indianapolis shops in Jeffersonville, Ind., have nearly completed two new passenger cars for the road. They are of a new pattern, and have been built under the supervision of Master Car-Builder E. Austin.

The Missouri Pacific car shops in St. Louis are building a baggage car and two passenger cars for the road.

The Georgia Car Co. in Cartersville, Ga., is building some box cars for the new Memphis & Vicksburg road.

The Northern Pacific shops at New Tacoma, Wash. Ter., are to build 6 baggage and 12 caboose cars, 250 box, 100 stock and 300 flat cars for the road. These shops are now just finishing an order of 100 box and 50 flat cars.

Bridge Notes.

The Penn Bridge Works at Beaver Falls, Pa., are building a number of the bridges for the Pittsburgh, McKeesport & Youghiogheny and the Pittsburgh & Western roads, and are also filling several contracts for highway bridges.

"Bridge Notes" are the most difficult to procure of all manufacturing items. Bridge builders are generally very reticent about their doings, and it is almost impossible to get any news from them. Perhaps it is because the competition among them is so sharp, and they do not want to let their rivals know what they are doing; perhaps it is suggested by a malicious friend, who is not a bridge-builder—they do not want people generally to know whose bridges tumble down.

Iron and Manufacturing Notes.

The Delaware Rolling Mill at Phillipsburg, N. J., which was recently obliged to suspend work on account of the failure of W. A. Leavitt, of Philadelphia, started up again Dec. 4, an arrangement having been made with the creditors. The mill employs about 350 hands, and has a number of orders to fill.

The North Chicago Rolling Mill Co. has closed its North Side Mills for repairs. The South Side Mills continue in operation. It is stated that no more rails will be rolled at the North Side Mills.

The first blast furnace of the Manchester Iron & Steel Co. will soon be in blast, under the superintendence of Mr. A. C. Kloman. The company will erect another by and by, as the works are so arranged. The iron work was erected by Riter & Conley, brick work by Lean & Ferguson, and the hearth and the bosh and lining were supplied by Merriman & Lean, of Pittsburgh.—*American Manufacturer*.

Ozark Furnace, near Rolla, Mo., is being rebuilt by Pittsburgh parties, and will be put in blast as soon as completed. This furnace is said to be the largest charcoal furnace in the West, if not in the United States.

Swift's Iron & Steel Works in Cincinnati are running full time on boiler, tank and sheet iron, merchant bar and car and bridge iron.

The Philadelphia & Reading Coal & Iron Co. is running its rail mill in Reading, Pa., on an order for 2,500 tons of rails for the new branch of the Reading road from Shamokin to Sunbury.

Appleton Furnace at Appleton, Wis., is running one stack on Lake Superior ores and making 20 tons a day. The second stack is being repaired and will soon be ready to go into blast.

The Pennsylvania Steel Co., turned out from its rail mill at Steelton, Pa., in November, 17,385 rails, weighing 12,882 tons. In the frog shop the shipments of frogs and crossings for the month amounted to \$56,680, or about \$12,000 more than in October. The new shop for this department is nearly finished.

The Rail Market.

Steel Rails.—Quotations continue at \$40 per ton at mill, with plenty of small orders. One contract for 25,000 tons at \$40 has been closed by the Bethlehem Iron Co., and other large orders are on the market. The present outlook is for low prices, but most makers do not seem to anticipate any lack of work.

Rail Fastenings.—Spikes are in lighter demand, but quotations continue at \$3 per 100 lbs. Fish-plates are quoted at \$2.50 per 100 lbs.; track-bolts, \$3.70 to \$4 or \$4.10.

Old Rails.—Some small sales of tees (iron) are reported at \$26.50 to \$27 per ton in Philadelphia. Double-heads are quoted at \$29, with very few in market.

Titles.

Hereafter the letters "E. E." will not only stand for the old-time "Errors Excepted," but will be accepted upon visitors' cards and at the foot of technical articles as signifying "Electrical Engineer." This degree is coming into play in England, and will, of course, not be long in finding its way over. Titles are getting somewhat mixed, anyway, and definitions are sadly needed sometimes. "M. A." stands for "Master Architect," "M. E." for both "Mining" and "Mechanical Engineer," and "M. D." for "Mechanical Draughtsman." Some sort of thinning out would be in order.—*Iron*.

A Historical Car.

An old car now used on the new Greeley, Salt Lake &

Pacific road as a boarding car, and lately in use on the Union Pacific as an enigrant car, is said to be the car originally presented by the Pennsylvania Railroad Company to President Lincoln, and used by him in his trips to and from Washington. It is plated with sheet iron under the wood-work and has iron shutters to the windows.

Can any one of our readers give any information about this car?

The Joy Valve Gear.

We have received the following circular from Mr. John W. Hackworth, Consulting Engineer, dated Darlington, England, Nov. 6, 1882:

"Having ascertained that Mr. David Joy is introducing in America a valve motion precisely what I invented years before the date of his English patent—which is unquestionably an infringement of my patents, taken out in the United States of America, Dec. 3, 1872, No. 133,529, and Jan. 21, 1873, No. 135,036.

"I hereby notify you that should you adopt the above infringement, you will be held amenable to law for such violation."

The patents named in Mr. Hackworth's circular are described as follows in the *Official Gazette of the United States Patent Office*:

"No. 133,529.—Valve-Gearing for Steam Engine.—John W. Hackworth, Darlington, England.

"The rod or rods attached to the eccentric crank or radial pin maintain, for both back and forward motion, one general and uniform centre line, only deviating therefrom by an equal oscillatory movement on each side of the centre line of action, from which oscillatory movement the motion of the valve or valves is derived.

"*Claim.*—The rod *C*, operated by a crank or eccentric at one end, and reciprocating at the other end in a changeable path, having the valve-connection at an intermediate point, substantially as described, for producing two motions from one eccentric crank or radial pin—one motion for working that which is termed the 'lead' of the valve, and the other motion at an angle with the former, whereby a variable expansion and reverse motion is obtained, substantially as herein specified."

"No. 135,036.—Valve-Gear for Steam Engine.—John W. Hackworth, Darlington, England.

"Extends the eccentric rod beyond the pin or part which reciprocates in the changeable path, and the valve rod is attached to such overhanging end. By this means can obtain, when the reciprocating path is adjusted to be exactly radial to the shaft, the proper amount of motion to allow for lap and lead, and an increase of travel. The toothed rack is connected to the valve rod, and is operated by a worm wheel on an upright shaft.

"*Claim.*—The within-described arrangement of the valve rod *M*, pin *m*, and reciprocating pin *D* on the eccentric rod *C*, in combination with the eccentric *b*, changeable path *E*, and means for changing the position of the latter at will, as and for the purpose herein specified."

Train Orders.

General Superintendent Adams of the Fitchburg Railroad has issued the following order to employees: "When special orders, supplements or notices are received involving the safety of trains, the engineman shall see that his fireman reads and understands them. And the conductor shall see that his baggage-master, or on freight trains a reliable brakeman, reads and understands the same. Firemen, baggage-masters or brakemen, having read orders as above, must keep them in mind and must be prepared to correct any mistake which comes under their observation."

An Imposter.

Mr. Abraham Klohs, Superintendent and Master Mechanic of the Ogdensburg & Lake Champlain road, sends us the following:

"I have received notice that requests for passes are being presented to railway officials purporting to be issued from this office, by a person calling himself Oliver Simpson or Oliver Catline. These requests are made on forged letter headings, dated with a forged stamp, and signed with a forged signature. You are hereby cautioned against honoring same. No requests for passes will be made by me except by correspondence over my own signature."

The Brakeman—A Study.

The brakeman is a man who is employed by a railroad company to stand upon the top of a freight car and work both hands at the engineer and to help stop the train when it is necessary.

Next to being a bareback rider in a circus, the small boy pants to be a brakeman, so he can sit on the wheel of a brake and chew tobacco while the train is running at full speed. The fact that a brakeman is often seen pegging broadcast over the land on a wooden leg or minus one arm often causes people to believe that he is an old soldier, or has served a term in a base-ball club.

There are two kinds of brakemen, the passenger and freight. The passenger brakeman is a gentleman of considerable leisure, and by the nonchalant way in which he comes through a car and tramps on the passengers' feet is often mistaken for the conductor.

He does not have much else to do but to slam doors, growl at the porter, and when the train arrives at a station to yell "Ponooyah," when he should say "Ponchatoula."

The freight brakeman is an entirely different man. He is grim, silent and dignified. He seldom speaks except to curse the green hand on the rear end of the train, whom he affectionately refers to as a "—pudding." Despite his faults, however, he works hard and very often rises to a position of importance, unless some day he tries to use his body as a coupling-pin and fails.

At night, when a freight train is side-tracked at a meeting point, and all his companions are squatted on a pile of cross-ties, the brakeman is in his glory. He then discusses ad libitum the affairs of the road, and criticises every one from the president down to the most humble official. He does not hesitate to say that if the president can't run a road any better than he does he should go off somewhere and drive a canal-boat.

After he has said this and other things concerning the asininity of the officials in general he turns to one of his companions and says: "Jimmie, did you ever know that fellow Bill McGinty, who has just been appointed superintendent of the J., K. & C.?"

"What, McGinty? Of course I've seen him, and you bet he's a fine old plumb to be a superintendent."

"Well, I should think he was. I was brakeman on the Southern Division of the L. & N. when he got his first job—old Matt Johnson was pulling us—and McGinty was so green he didn't know a draw-head from a switch-frog. No matter how slow old Matt Johnson backed up, that fellow couldn't couple a car, and sometimes for half an hour we were backing up and going ahead until you could hear Matt Johnson curse for two miles off. I'll be— if I don't think he tried to kill McGinty. He used to come back and jam the draw-heads under the cars, but when he pulled ahead again McGinty would step out without a scratch on him. A road, I tell you, is mighty hard up when they take such a thing as McGinty."

At the conclusion of such a speech the whole crowd of

brakemen will review the history of McGinty, and finally, without a dissenting voice, will arrive at the conclusion that he is a "fine old plumb." The brakeman is to be admired for the remarkable manner in which he gets wind of various and sundry plans which the management intend to place in operation and which to keep quiet.

The brakeman will sit on the end of a cross-tie, and swap opinions concerning the wisdom of the president in concocting such a plan long before the clerks in the general office obtain the merest inkling of it. If an appointment is to be made he will tell you the name of the man and the time the appointment is to go into effect.—*New Orleans Times-Democrat.*

Hardening Taps and Dies.

A correspondent of the *English Mechanic* describes the following method of doing this work:

"The great difficulty in hardening tools is principally their liability to twist or get out of truth; secondly, cracking (especially if large) after hardening; thirdly, getting the right temper. In our factory we use a great number of small taps and rimers, some of the rimers are 9 in. long and 1/4 in. diameter; these we harden very successfully, not more than one out of a dozen being out of truth. Our plan is as follows: First, carefully select your steel; let it be of the best cast, with a medium grain (a fine-grained steel will break when much less force is applied than a coarser-grained, and, although it will take a keener edge, it will not resist the strain required by a tap or rimer). Next centre it, and turn off the scale and soften. The object of softening after the scale is removed is to make the grain of the steel equal throughout; if it be softened with the scale on it will generally cast. To soften inclose the articles in a piece of gas-tube, filling up with wrought-iron turnings and plugging the ends with clay, making the whole red-hot and allowing it to cool very slowly—i. e., leaving it in hot ashes all night. This method makes the steel very soft, and equalizes the grain. After softening turn up the work, taking care not to bend it or straighten it, should it have cast, as it probably will in the process of softening. The reason for this is that if the steel be bent or hammered, the grain will be closer in one place than another, and heat has a great tendency to bring it back to its original position. The next thing after finishing your tool is to harden it: first slightly heat it over a gas or other flame, and rub it all over with a mixture of Castile soap and lampblack. This is to prevent the edges from being burnt. The next is to get a thick iron pipe (the size we use is 2 in. diameter and 1/2 bore). This is well filled up with taps or rimers and charcoal dust, the ends being closed with clay as before. This is placed in the furnace and occasionally turned, until it is one uniform heat of cherry red, or on the outside a trifle hotter. It is then carefully removed from the fire, one end of the clay knocked off, and the contents allowed to drop perpendicularly into a solution of water, chloride of sodium, and nitrate of iron; this solution is kept at a temperature of 60 degrees. The articles hardened should remain at least a quarter of an hour before being removed. This method of hardening may be summed up thus. Make the steel of one grain throughout, prevent it from oxidizing while being heated, allow every part to heat at the same time, avoid bending while hot, and lastly restore if possible, by adding to the loss of carbon caused by heating. As I have taken up already too much of your valuable space, I will defer the method of tempering to some future time."

Locomotive Boiler Explosions.

The last number of the *London Engineering* received contains a list, prepared by Mr. Lavington E. Fletcher, Chief Engineer of the Manchester Steam Users' Association, of 66 locomotive boiler explosions, which have occurred in Great Britain between July, 1861, and December, 1881, with some notes thereon by the same author. In these he says:

"On consulting this list it will be seen how great a number of the explosions arose from internal longitudinal grooving, and whenever the barrel of a locomotive boiler gives way it may be almost taken for granted that longitudinal grooving has been the cause of the rupture. This longitudinal grooving occurs close to the edge of the overlap, and arises whether the seam be double or single riveted. It is now prevented by dispensing with the overlap and adopting double butt-strips, one of which is placed inside, the other outside, so as to make the barrel of the boiler truly cylindrical. This prevents a change of form on every change of pressure; the structure remains at rest, and the buckling action which gives rise to grooving is not set up. In addition to this, internal examinations are now made more frequently than they used to be; so that, where the overlap joint is retained, incipient furrows can be detected before they attain dangerous dimensions. An internal examination of a locomotive boiler involves taking out the tubes, but this is an expense that ought to be faced, in the interest of the public safety, at least once every three years."

The Weehawken Tunnel.

The Weehawken Tunnel is so far completed as to permit daylight to be seen through it. The great bore from the western end to a point about midway between the eastern portal and the first shaft was first cleared. Recently a blast was fired there in the heading, which removed all obstruction to connection with the approach. The Weehawken bluffs, through which the tunnel has been cut, are a continuation of the Palisades, and rise as do the latter almost precipitately from the banks of the Hudson on the east and from the Hackensack Valley on the west. The eastern approach has been cut through a solid block of granite, and is 150 ft. in length and 56 ft. in width. The tunnel itself is 4,000 ft. in length and is built directly under the line that separates the townships of Union and Guttenberg, having a width of 27 ft. and a height of 21 ft. As one descends into the interior by the shaft through a solid wall of granite to the depth of 150 ft., he obtains some idea of the skill and labor requisite to surmount the obstacles to the undertaking.

There are five shafts which are used to convey the rock and mud from the interior to the surface, and which will be serviceable, when traffic is opened, for ventilation, having an average depth of 150 ft. The steam shovel, which is comparatively a recent invention, has here done effective service. With its ponderous prongs it is capable of loading a train of cars in fifteen minutes, carrying away mounds of earth in an astonishingly short space of time. Night and day the seventy drills have been in constant use, impelled by Rand's compressed air system. This was adopted in preference to the steam drill, as it diminishes the risk of accidents to the workmen, and the machinery is not so liable to get out of repair. The tunnel was begun in January, 1881, under a contract of Smith, Ripley & Coleman with the New York, Ontario & Western Railroad. Mr. Coleman has been the representative of the firm having the work in special charge. In the first two years the eastern approach and 600 ft. of the tunnel were completed. In January, 1882, Mr. Coleman retired and Mr. Stanton became the Superintendent. Since that time rock has been pierced 3,400 ft.

The railway corporation owns nearly two miles of water front at Weehawken, and scores of workmen are already at work constructing piers. Extensive freight houses and railroad depots are to be erected, ferry-boats are to be run to

Forty-second street, this city, and a bridge is to connect the brow of the bluff with the shore, thereby saving a toilsome journey. The first station after leaving the tunnel will be New Durham. Thence, following the Palisades, the railroad will run to Haverstraw, Newburg, Middletown, Albany, Syracuse, and finally to Buffalo.

The estimated cost of the tunnel was about \$1,250,000, but in consequence of many improvements which are in contemplation it is likely that the amount will be very much increased. The accidents in the construction of the tunnel have been comparatively few. Five men have been killed, and about the same number seriously injured. The accidents have been all the result of direct carelessness on the part of the workmen, and in no respect owing to the lack of precaution on the part of the men in charge. It will require about six months longer to complete the tunnel and the approaches.—*New York Tribune, Dec. 3.*

A Terrible Death.

Very early on the morning of Dec. 5th a passenger train on the Pennsylvania & New York road ran over a misplaced switch and into the head of a freight train which was standing at Rummerville, Pa., waiting for the express to pass. The switchman had signaled the passenger train to come on, that all was right. The passenger engine mounted on the top of the freight engine and both went over together, the baggage and mail cars piling up on top of the tender. The fireman of the freight was caught under the engine and instantly killed; the engineer had a leg pinned fast under the engine, and as the wreck caught fire, he called to those around him for help. Every effort was made to save him, but the fire spread very fast, burning up the cab and wood-work of the engine, and the trainmen and passengers were compelled to stand by and see him burn to death. He met his fate with great courage, and seemed to realize that his rescue was impossible.

New Forth Bridge.

The contract for the construction of the new Forth railway bridge in Scotland, has been let to Sir T. S. Tancred, C. E., London, and Messrs. W. Arnold & Co., of the Dalmarock iron works, Glasgow. The amount of the contract is £1,600,000 (\$7,680,000). It will be remembered that on account of the failure of the Tay bridge, the plans of the Forth bridge which spans the Frith of Forth a very deep and rough channel, were considerably modified, the height being reduced and the iron work considerably strengthened. As now arranged the distance from shore to shore, which is a mile, is divided into 4 spans, the two middle ones being 1,700 ft. each, and the piers 350 ft. high.

A Peculiar Accident.

A dispatch from Whitehall, N. Y., Nov. 30, says: "At Plattsburgh this afternoon while workmen were engaged in lowering from a derrick car a heavy stone for an abutment of the bridge where the Delaware & Hudson Railway crosses the Saranac river, the descent of the stone was checked too suddenly, causing the derrick car to tip into the river, dragging the tender of an engine with it. William Hefferman, master mason from Green Island, was instantly killed, and two others were seriously injured. A mason named James Murray is missing, and is supposed to be under the tender."

Theatrical Deadheads.

One of the mysteries in railroad operations is that so much is done in the way of courting the non-paying theatrical business. A representative of *The Journal*, a day or two since, chanced to be in one of the local outside offices when one of those cheeky advance agents of a theatrical troupe came in. The first thing he called for was a railway guide, the looking over of which, laying out his route for a couple of weeks, occupied fully fifteen minutes. His first request was a pass for himself and his lithographer to a point 384 miles away, with a dozen of stop-offs. Then, in a few days, his programme distributor would be along, and he wished a pass for him and some 800 lbs. of baggage. Then, at the same time, there would be boxes weighing 1,300 lbs., which he wished sent through to the terminus of the route laid out, free. This was all consented to. The advance agent then remarked that there was 25 cents a day storage on the last named box, which he wished the local agent would arrange with the baggage-man to throw off. He then asked for an order for the treasurer of the troupe for the 13 tickets, in which the amount (1 cent per mile for each) would be stated. Then the matter of connection was brought up, and it was found necessary to hold the train thirty to forty minutes at three points, that they might fulfil their engagements. This was all arranged. Then the advance agent remarked that their scenery was bulky, and probably it would be necessary to put it on a special car to carry it.

Just then a sturdy farmer who proposed to immigrate to a Kansas point, came in, stating that himself and his wife, his wife's sister and seven children were to immigrate there and he wanted the lowest rate. The local agent named the rate, which was 2 3/4 cents per mile per head, carried this side of the Missouri River, and an arbitrary rate was added on the west side. Here the baggage question came up, and it was found that it would cost him some \$18 to get it through, owing to excess in weight. The farmer, who was going West to furnish produce which would be carried over these very roads, accepted the situation, called for the tickets, but, as he pulled out his pocketbook, said: "Look here, captain, can't you put a little chap we have, about six years old, through free?" "Well, no; but I tell you what I will do—I will get him through on half fare." The farmer paid his money and left, but the advance agent was still there using the paper of the railroad company, and writing two or three telegrams which he wished sent free. The reporter left at this juncture, thinking that were he a general manager the theatrical party should pay big rates and the horny-handed farmer should be the favored one of the two.—*Indianapolis Journal.*

OLD AND NEW ROADS.

Addison & Northern Pennsylvania.—Track on this road is now laid to Gaines, Pa., 14 miles southwest from the late terminus at Westfield, and 40 miles from the junction with the Erie at Addison, N. Y. Trains have begun to run to the new terminus.

Albia, Carmi & Shawneetown.—This company has been incorporated to build a railroad from Olney, Ill., southward to Shawneetown, on the Ohio River. The office is at Carmi, Illinois.

Bloomfield.—Suit has been begun to foreclose the mortgage on this road, the complaint being filed in the United States Circuit Court in Indianapolis, Nov. 29. The road is of 3 ft. gauge, extending from Swift City, Ind., west to the Illinois line, 32 1/2 miles, and has been worked as part of the Springfield, Effingham & Southeastern road.

Boston & Albany.—This company is putting in a system of interlocking signals and switches in the yard and in the approaches to the passenger station in Boston.

Buffalo, Pittsburgh & Western.—Regular trains on this road now run through to Salamanca, N. Y., over the new extension.

Work has been begun on the grading of the new line from Salamanca east to Olean.

Canada Southern.—At the special meeting in St. Thomas, Ont., Nov. 30, the stockholders voted to approve the contract with the Michigan Central Company. The agreement is for 21 years from Jan. 1, 1883, and is subject to revision, as far as the division of earnings at least, at the end of each period of five years. It provides for the operation of the Canada Southern by the Michigan Central; also for the placing of the total earnings of both roads in a common treasury, out of which are to be paid, first, the operating expenses of both roads; second, the fixed charges of both; third, the division of the remainder between the two in the ratio of two-thirds to the Michigan Central, and one-third to the Canada Southern; fourth, for the raising of \$6,000,000 by the issue of new bonds on the Canada Southern to double-track its line, to build a bridge over the Niagara River, and also a cut-off at each end of the line, so as to shorten it about 30 miles; also to increase the equipment as may be needed.

Central Vermont.—The plan of reorganization offered to the creditors, including the Vermont & Canada stockholders and the Vermont Central bondholders, is as follows:

First.—There shall be issued \$7,000,000 of bonds secured by a first mortgage on the Vermont Central and the Vermont & Canada railroads, and the equipment appertaining thereto, payable in thirty years from July 1, 1883, with interest at the rate of 5 per cent. per annum, payable semi-annually on the first days of January and July in each year, the further allowance of three months' interest, from April 1 to July 1, 1883, being allowed to such parties as exchange their bonds before April 1, 1883.

Second.—One million dollars of the aforesaid bonds shall be distributed among the stockholders of the Vermont & Canada Railroad Company, in exchange for the shares of that company, at 33½ per cent. of the par value of said shares.

Third.—Four million three hundred and fifty-seven thousand dollars of the aforesaid bonds shall be distributed in exchange for a like amount of trust bonds, known as "equipment," "income and extension," "guaranteed," and "Standard, Shefford & Chambly" bonds. The exchange is to be dollar for dollar, the overdue interest on said trust bonds being thrown in by way of compromise.

Fourth.—The balance of the aforesaid bonds, \$1,643,000, shall be issued to retire the floating debt, estimated at \$1,000,000, and the other indebtedness of the trust, including the claim of the Central Vermont Railroad Company, estimated at \$643,000, not including stock owned by the trust.

Fifth.—There shall be issued 7,500 shares of \$100 each of preferred capital stock of the company, under which this plan is to be carried out in exchange for the first and second mortgage bonds of the Vermont Central Railroad.

The aforesaid stock shall be entitled to 6 per cent. dividends annually, if earned, but not cumulative, in preference to the common stock of the said company. This stock shall be issued in exchange for first mortgage bonds at the rate of 20 per cent. on the dollar of their face value, and for second mortgage bonds at the rate of 10 per cent. on the dollar of their face value, overdue interest on both first and second mortgage bonds to be thrown in by way of compromise. The American Loan & Trust Company, of Boston, is the agent and attorney to carry out the above plan.

Chesapeake & Delaware Canal.—At the annual meeting in Philadelphia, Dec. 4, a plan was proposed for the purchase of steamboats by the company and its entrance into business as a common carrier. Heretofore its entire revenue has been derived from tolls on boats owned by other parties. The advocates of the plan objected to the reception of votes on the stock owned by the United States and the state of Maryland, but the plan was finally defeated by a small majority by the votes of the private stockholders alone.

Chicago, Burlington & Quincy.—The Joliet, Rockford & Northern Branch is now completed from Serena, Ill., on the Fox River Branch, northwest to Paw Paw on the Rock Falls Branch, crossing the main line at Earl. It is 23 miles long, and makes a short line between Streator and Ottawa on the south and Rock Falls and Sterling on the north.

Chicago, Milwaukee & St. Paul.—The deed conveying the Chippewa Valley & Superior road to this company has been filed with the Secretary of State of Wisconsin. The terms of the sale are as follows: The St. Paul road receives the Superior road, which runs from Reed's Landing and Wabasha to Eau Claire, its branch from the mouth of Red Cedar Valley River to Menominee, and four mill branches, 75 miles in all, together with the bridge across the Mississippi, all rolling stock, rights, and privilege belonging to the road, and pays therefor \$1,575,000 in negotiable bonds of the St. Paul road, secured by a mortgage on the property conveyed and on the St. Paul road. The interest on the bonds is 5 per cent. payable semi-annually. The deed bears date of Nov. 9.

Chicago & Northwestern.—The Sioux River Branch is now completed and open for business from Brookings, Dak., on the Central Dakota line, north 34 miles to Castlewood.

The Southeastern Dakota Extension is to be run through to Iroquois, Dak., 126 miles beyond Hawarden, Ia., and 268 miles from the Northern Iowa Division at Eagle Grove.

Work is now in progress on the branch from Batavia, Ill., to Aurora, seven miles. All the right of way has been secured.

Cincinnati & Eastern.—This road is now in operation from Cincinnati to Peebles, 71½ miles. The work of construction on the remaining 33 miles to Portsmouth is progressing rapidly, and it is expected to have trains running through early next spring.

There will be a bridge 1,000 ft. long across the Scioto River near Portsmouth, the masonry for which is nearing completion. Dewey & Campbell, of Cincinnati, have the contract, and are prosecuting the work with vigor. When completed to Portsmouth this road will be changed from 3 ft. to standard gauge.

Danville & New River.—Work is in progress on the grading of this road beyond the present terminus at Martinsville, Va., and the company hopes to have trains running to Smith's River by March, and to Patrick Court House by the end of 1883. The intention is not to stop at that point, but to continue the line over the mountains to a junction with the Norfolk and Western.

Denver & New Orleans.—The branch line to Colorado Springs is now completed. It is nine miles long from the junction with the main line, and gives the company another point of competition with the Denver & Rio Grande.

Effingham & Northwestern.—This company has been organized to build a railroad from Effingham, Ill., to connect with the Toledo, Cincinnati & St. Louis road.

Galveston, Harrisburg & San Antonio.—Some rock-cutting still remains to be done on the short gap still remaining on the El Paso Extension. There are eight bridges to be built also, but six of these will be temporary wooden structures, which will be replaced by permanent bridges as soon as possible after the road is opened.

Grand Trunk.—London papers of Nov. 18 have advertisements of an issue of £310,000 of first-mortgage bonds of the Michigan Air Line Railway, to provide for the amount already expended on the purchase and construction of this road from Ridgeway, 35 miles, to Pontiac, and for extending it 70 miles to Jackson, Mich. The Grand Trunk has agreed to work the road and to pay £2,255 on account of the 35 miles in operation and £12,245 for the 70 miles yet to be built, for 20 years, which is equal to the interest on the whole issue of bonds.

The extension will give the Grand Trunk access to the important traffic centre, Jackson, and will give it a connection with the Toledo, Ann Arbor & Northern from Toledo. The issue price was 94½ per cent. cash.

Indiana, Illinois & Iowa.—The *Kankakee (Ill.) Gazette* says: "The contract price for the construction of the Three I Railroad was \$22,000 per mile for the 63 miles between Streator and Moline, or \$1,386,000 in the aggregate; the amount to be paid in the first mortgage bonds of the company. Temporary mortgage bonds to the amount of \$600,000 were issued last week to the Western Air Line Construction Company, to enable the latter to continue the work between Moline and North Judson, Ind."

Jersey Shore, Pine Creek & Buffalo.—Track on this road is now laid from the junction with the Corning, Cowanesque & Antrim road at Stokesdale, Pa., southward 18 miles, and from Williamsport, Pa., northward 8 miles. Work is progressing steadily.

This is the line which is to connect the Reading road with the New York Central.

Kaaterskill.—This company has been organized to build a branch road from Tannersville Junction, N. Y., on the Stony Clove & Catskill Mountain road, to a point near the Kaaterskill House. Work will be begun early in the spring.

Lebanon Springs.—The following statement is published showing the gross earnings for the year ending Sept. 30:

1878-79.....	\$59,284
1879-80.....	68,343
1880-81 (eleven months).....	71,520
1881-82.....	93,579

Up to Oct. 23, 1880, the road was operated by the Harlem Extension South Coal Transportation Company; since Oct. 28, 1880, it has been operated by Mr. J. W. Van Valkenburgh as Receiver, under appointment from the New York Supreme Court.

Milwaukee, Lake Shore & Western.—Track on the main line is now laid to Rhinelander, Wis., 14 miles north of the late terminus at Monico, and 255 miles from Milwaukee. With the Two Rivers, Oshkosh and Wausau branches, the company now has 307 miles of road. Rhinelander will be the winter terminus.

Minneapolis & St. Louis.—This company has filed for record a new trust deed to Central Trust Company of New York. The deed is for \$4,000,000 and is given to cover an issue, in two series, of bonds to be called the improvement and equipment bonds. The deed is a first mortgage on all the rolling stock and equipment of the road, and covers all other property of the road, subject to other mortgages and claims. The money received is to be used to relay the present track with steel rails, to buy certain valuable property in Minneapolis, and to make other improvements. The \$800,000 bonds, known as the consolidated mortgage bonds, will be taken up with a part of the money. The instrument is dated Oct. 12, 1882.

Minnesota Central.—Track on this road is now laid for 11 miles eastward from Cannon Falls, Minn., and 56 miles from the starting point at Waterville. Work is being pushed toward Red Wing as fast as possible.

Montclair & Morristown.—An effort is being made to revive this project for a branch from the New York & Greenwood Lake road at Upper Montclair, N. J., through Caldwell to Morristown. The most expensive work will be a tunnel at Upper Montclair, on which work was begun ten years ago, but afterwards abandoned.

Naugatuck.—Preparations will be begun shortly for the laying of a second track on this road from Stratford, Conn., to Waterbury. Most of the rock cutting necessary will be done this winter, so that the necessary grading can be carried through next season.

New York, Chicago & St. Louis.—On Dec. 1 Judge Burke paid another installment of \$1,000,000 on the purchase of the stock of this road, making \$3,850,000 paid so far, and leaving \$9,000,000 more to be paid.

New York & Long Branch.—Reports are current that the New Jersey Central people are very much dissatisfied with the results of the joint operation of this road last season by the Central and the Pennsylvania, and that notice has been or will be given of a termination of the contract. The officers of the Pennsylvania say that they have received no such notice as yet.

New York & New England.—At the annual meeting in Boston, Dec. 5, a statement was made by the President that the corporation ranks third among New England roads as to gross receipts; that the business is now beyond what it can do promptly; that double tracks are to be largely increased, and that accidents have occurred rather from overzeal than other causes. President Wilson said: "During the last 90 days the business of the company has increased to an extent that made it absolutely impossible for the company to handle it, and it had, therefore, been necessary to refuse freight. There is now plenty of money to make all the improvements that are needed at present, and the management will not, under any circumstances, incur obligations that will create a floating debt." He referred briefly to the conditions of the terminals in Boston, and the needs in this direction at Hartford and other points along the line; told of negotiations now in progress to better them, and of the future opportunities of the road if the progressive policy now in vogue was followed up. He defended the management and all the employees against the recent severe criticism to which they had, as he claimed, very unjustly been subjected. The accidents of the past 20 days were due alone to the sudden rush of business and the desire of the employees, unwisely perhaps in many instances, to handle the greatest amount of it possible. That the evils of the past would speedily be entirely remedied he was now very confident. The meeting then adjourned.

New York, Philadelphia & Norfolk.—This company has been formed by the consolidation of the Worcester & Somerset Company, of Maryland, and the Peninsular Company, of Virginia. The consolidated company owns a completed road from Peninsular Junction, Md., to Poca-

moke, 10 miles, and is building a line thence to Cherrystone, about 65 miles.

New York, Pittsburgh & Chicago.—It is said that this company will soon begin work on its projected line from Pittsburgh, Pa., to Marion, O., 177 miles, connecting at Marion with the Chicago & Atlantic. This announcement, however, has been made several times before.

New York, West Shore & Buffalo.—The *Commercial and Financial Chronicle* of Dec. 2 says: "The negotiations for the sale of a large amount of first-mortgage bonds of this company have been concluded to-day with Messrs. Winslow, Lanier & Co., of New York, on behalf of a powerful syndicate of European and American bankers, which they have organized, including a number of wealthy railroad capitalists and investors. By this sale \$15,000,000 of cash will be provided, which, with the former sales of bonds at par still subject to call, it is estimated will complete the road to Buffalo, with the requisite equipment and terminal facilities. The bonds have been taken at an average price of 74 per cent. and accrued interest, net to the company, payable in instalments as wanted for construction. Besides completing the road and providing for extensive improvements upon the terminal grounds already secured, \$2,000,000 will be invested in equipment in addition to the \$4,000,000 already appropriated for that purpose, and a surplus of cash reserved for interest requirements during construction and for a period thereafter."

Norfolk & Western.—The track of the New River Division is now completed to a point 21 miles beyond the late terminus at Glenlyn, Va., and 59 miles from the junction with the main line at New River Station. About 15 miles remain to reach the terminus at Pocahontas and the grading is all finished.

Work on the Cripple Creek Division, south of the main line, has been suspended for the present.

Northern Pacific.—Track has reached Livingston, Montana, which is 1,031 miles from St. Paul, 1,011 miles from Superior City and 38 miles beyond the last point noted. It has been decided to push forward the track this year to the Bozeman tunnel, 30 miles west of Livingston, and the contractors hope to reach that point before a heavy snow falls.

North Shore.—A dispatch from St. Albans, Vt., Dec. 5, says: "The Grand Trunk and Central Vermont railroad companies have bought the North Shore road from Montreal to Quebec. The control of this road has caused considerable strife between the Canadian Pacific and Southeastern roads on one side, and the Grand Trunk and Central Vermont on the other. Three years ago the Southeastern secured control of the traffic on the Quebec, Montreal, Ottawa & Occidental Roads, of which the North Shore road was a part, for 50 years, unless the latter should be disposed of by sale. The Southeastern, by this contract, virtually had control of the large grain and passenger business from the north side of the St. Lawrence River, between Montreal and Quebec. The contract is now terminated by this sale. The negotiations ended on Saturday last, and the purchasing roads will take possession of the North Shore road at once. It is proposed now to construct a loop line between Hochelaga and the Grand Trunk, near Point St. Charles, a distance of three miles, to make a continuous line into the Grand Trunk station, and to open the Victoria Bridge to traffic from the North Shore. While securing to the Central Vermont the traffic from that territory, this connection opens to the Canada-Atlantic Railway a direct line from Ottawa to Quebec. It also gives the Grand Trunk a better outlet for Western traffic for foreign shipment via Quebec."

Later dispatches state that this reported sale is denied by some parties interested and affirmed by others. The Grand Trunk would undoubtedly like to secure control of the North Shore road.

Norwich & Worcester.—This company has filed a petition to the Massachusetts Legislature for authority to purchase and hold stock in any incorporated company running steamboats between New York and the terminus of its road.

Owensboro & Nashville.—This road is now completed to Ricedale, Ky., four miles southward from the late terminus at Bevier and 44 miles from Owensboro.

Palouse & Columbia River.—Work has been begun on this road, which is to run from a point on the Northern Pacific about 50 miles from Wallula Junction, Wash. Ter., easterly to Moscow, Idaho, with a branch to Farmington. It is controlled by the Oregon Railway & Navigation Company.

Pensacola & Atlantic.—The track is now laid continuously from Pensacola, Fla., eastward to Ponce de Leon, 91 miles. There is now only a little over 25 miles of track to be laid.

Philadelphia & Reading.—Current rumor is that President Gowen, since his return from England last week, has been actively engaged in negotiations for a lease of the New Jersey Central road by the Reading. It is also reported that he is not meeting with much success, as the officers and large stockholders of the Central have no disposition to make a lease without guarantees which the Reading is not by any means in a position to give.

Richmond & Mecklenburg.—Track on this road is now laid to Chase City, Va., 17 miles south by east from the junction with the Richmond & Danville at Keysville. No more track will be laid at present. The road is controlled by the Richmond & Danville Company.

Richmond & Petersburg.—In the Richmond (Va.) Circuit Court on Dec. 4, the first suit brought against this company to recover damages for property burned at the time of the burning of the company's bridge over the James River, was decided in favor of the company, the Court holding that its liability had not been established. The amount concerned in the suit was \$10,000; but it is a test suit, upon the result of which depend other suits, amounting to about \$350,000 in all. An appeal will probably be taken in this case.

Rochester & Pittsburgh.—Track on the Buffalo Division is now laid for five miles from East Buffalo south by east, and also for five miles from the junction with the main line at Ashford, N. Y. The contractors have also graded and laid track on nearly three miles of sidings in the East Buffalo yard.

Rome, Watertown & Ogdensburg.—This company makes the following statement for October, the first month of its fiscal year:

Earnings.....	\$172,737
Expenses.....	105,582
Net earnings.....	\$67,155

As compared with October, 1881, the net earnings show an increase of \$18,394, or 37.7 per cent. The road is reported as doing an unusually large business on all its branches this fall.

St. Louis, Alton & Terre Haute.—Negotiations, it is stated, are about concluded for a new lease, or, rather, a renewal of the old lease, of this road to the Indianapolis & St. Louis Company, the renewal being made necessary by the reorganization of that company. The lease will be guaranteed by the Cleveland, Columbus, Cincinnati & Indianapolis, and will be practically to that company, which now wholly owns the Indianapolis & St. Louis. It is said that the minimum yearly rental will be \$450,000 a year, as now, but that there will be a provision for the reduction of the proportion of gross earnings paid as rental below 80 per cent., should the earnings of the leased road rise over \$1,750,000 a year. Some details are still to be arranged.

St. Louis & Cairo.—Work is in progress on the extension of this road from East Carondelet, Ill., to East St. Louis, five miles. The trains now run over the tracks of the East St. Louis & Carondelet road.

A connection has been made at Murphysboro, Ill., with the Grand Tower road, and coal from the Grand Tower and Mt. Carbon mines will hereafter be sent to St. Louis over this road.

Surveys are being made for a branch from Columbia to Georgetown in St. Clair County. This branch will open up a new coal district.

St. Paul, Minneapolis & Manitoba.—This company has recently opened for traffic the extension of its Northern Division from Grafton, Dak., north to Bathgate, 32 miles. This line is now 172 miles long from the main line at Barnesville and will soon be finished to Neeche on the Manitoba line. It runs down the west side of the Red River Valley, parallel to the main line on the east side.

The Hope Branch is now completed from Ripon, Dak., on the Breckenridge Extension, northwest to Hope, 39 miles.

South Carolina.—The capital stock of the South Carolina Railway Company has been reduced from \$5,800,000 to \$4,200,000, by the cancellation of 16,000 shares that had not been issued, but remained in the company's treasury.

Springfield & New York.—A report was telegraphed from Springfield, Mass., last week to the effect that surveyors had been at work some time running a new line from Springfield to New York parallel to the New York, New Haven & Hartford. It was also stated that these engineers were in the employ of the Delaware, Lackawanna & Western Company. Officers of that company, however, deny all knowledge of the project.

Toledo, Cincinnati & St. Louis.—A meeting of holders of this company's securities was held in Boston, Dec. 2, which was largely attended. It was stated that large subscriptions had already been received towards the fund of \$800,000 to be raised for the purpose of completing the road and providing terminal facilities. The following resolutions were passed:

"Whereas, A committee of the security-holders of the Toledo, Cincinnati & St. Louis Railroad Company, after making a careful investigation of the property, have made their report to the directors, and the same has been presented to this meeting. Now, therefore, be it

"Resolved, That we hereby ratify and approve the suggestions of that committee, and recommend their adoption by the board of directors, namely: First, that the holders of the first-mortgage bonds surrender their coupons for two years and accept in exchange therefor the 6 per cent. scrip of the company; second, that the sum of \$800,000 be raised by subscription to put the property in the condition recommended by the committee, the company to issue to the subscribers its 8 per cent. debenture bonds substantially in the manner recommended by the committee.

"And further, whereas, it seems expedient and necessary that the holders of all the securities of this company shall be fully and immediately informed of its present condition and needs, be it

"Resolved, That Charles W. Pierce, George W. Morse and Willard White be appointed a committee to call upon and personally present the claims of this company to all the parties in interest, obtain the consent of the first-mortgage bondholders to the funding of their coupons, and solicit subscriptions to their fund."

Troy & Greenfield.—The Springfield Republican of Dec. 4 says: "The equity of the old Troy & Greenfield Company in the state road and tunnel was sold Saturday at auction for A. J. Waterman by Deputy Sheriff Nash to W. H. Bixby for \$5,151, which includes a \$3,500 judgment, interest for six years and costs. It settles an old case that has been in the Berkshire courts for some time. In 1866 Henry B. Waterman, of Williamstown, was killed by a Troy & Boston train at the Moody Bridge in that town. Before that the interest of the Troy & Greenfield Company had been mortgaged to and practically belonged to the state. The Troy & Boston Company could not be indicted, for they were a foreign corporation; neither could the state be sued, and as the old company was worthless, the matter rested there for some time. In 1874 the company was indicted, however, and though no one appeared as defendant, a trial was had in 1876, the jury giving the estate a judgment of \$3,500. The Troy & Boston Company, by the way, paid \$1,500 before that. Twice the matter has come before the legislative Railroad Committee and been referred back to the Troy & Boston, who simply used the road under a lease, as now. The Governor is now of the opinion that the state should pay the judgment. Finally a 'warrant of distress' was issued last summer by the Superior Court, and the equity of the old Troy & Greenfield Corporation, who claim the right to redeem, it is remembered, within 10 years from the opening of the tunnel, was attached. That interest was sold Saturday. Mr. Gooch, of Boston, represents some interests in the old corporation, and negotiations between him, the Governor, the district attorney and others, looking to a settlement, have been the occasion of six adjournments. They telegraphed for another only a few minutes after the sale Saturday."

Valley, of Ohio.—This company purposes building a freight branch in Cleveland, to reach some of the large iron works there; also a freight branch to reach several large factories in Akron. Two or three other short branches are projected at points along the line. A meeting of stockholders has been called for Dec. 16, to authorize the necessary expenditures for these branches.

Vermont Railroad Charters.—The Legislature of Vermont at its recent session passed bills chartering new railroads as follows:

Brattleboro & Bennington. to run from Brattleboro through Wilington to Bennington, about 37 miles. This is to be a narrow-gauge road.

Cross Valley. to run from the New Hampshire line in Guildhall northward through Essex County to the Canada line, about 45 miles. This will be chiefly a lumber road.

Rutland & Tidewater. to run from Rutland by Castleton, Fairhaven and Poulney to the New York line, about 30 miles.

Wabash, Chester & Western.—This road, which extends from Chester, Ill., northeast to Tamaroa, 41 miles, has been transferred to the St. Louis Coal Railroad Com-

pany, and will hereafter be operated as that company's Chester Division.

Wabash, St. Louis & Pacific.—A dispatch from St. Louis, Dec. 6, says: "The suit of the Union Stock Yards, of this city, against the Wabash Railway Company for \$500,000 damages for breach of contract, has been compromised. The suit is withdrawn at the cost of the stock yards and a new contract has been made, by which the Wabash Company binds itself to deliver live stock to the Union Yards from all points west of the Mississippi River at a rate less than to yards on the east side of the river by the amount of actual customary transfer toll. On all shipments from competing points the Wabash people give what concessions they want to shippers, but pay the Union Yards a toll of two dollars per car for all cars going through St. Louis and over the bridge."

Woodstown & Swedesboro.—The track on this road is now all laid and the ballasting is nearly finished, so that it will probably be ready for business this month. It extends from Swedesboro, N. J., the terminus of a branch of the West Jersey road, through Woodstown to a junction with the Salem Branch of the same road near Alloway, a distance of 11 miles. It will open up a new section of country, and will reduce the distance between Camden and Salem from 43 to about 84 miles. The road will be leased and worked by the West Jersey Company.

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the present volume of the Railroad Gazette:

Alabama Great Southern	Page	Louisville, New Alb. & Chl.	Page
Alabama Minor Railroads	41	Manchester & Lawrence	340
Allegheny Valley	384	Massachusetts Minor R. R.s	218
Atchafalaya & S. F.	283	Memphis & Charleston	498
Atlanta & West Point	484	Mexican Central	217
Baltimore & Hanover	638	Michigan Central	287, 288
Baltimore & Ohio	720	Min. Lake Shore & Western	405
Baltimore & Potomac	589	Minnesota R. R. Commissioner	54
Bangor & Piscataquis	190	Mississippi & Tennessee	41
Boston & Albany	675	Missouri Pacific	190
Boston, Concord & Montreal	345	Mobile & Girard	483
Boston & Lowell	40	Mobile & Ohio	488, 698
Boston & Providence	697	Montpelier & Wells River	420
Buff. Pittsburgh & Western	484	Nash, Chattanooga & St. L.	632
Bur. Cedar Rapids & No.	345	Natches, Jackson & Col.	101
Cairo & St. Louis	590	New Haven & Derby	105
Camden & Atlantic	403	New Haven & Northampton	100
Canada Southern	389	New London Northern	34
Canadian Government Roads	126	N. Y. Lake Erie & West. 95, 720, 748	
Cape Fear & Yadkin Valley	324	N. Y. N. Haven & Hartford	6
Central Iowa	142, 340	N. Y. Ontario & Western	96
Central of Georgia	601, 737	N. Y. Pennsylvania & Ohio	190
Central of New Jersey	628	N. Y. Susquehanna & West.	296
Central Pacific	217, 644	North & Western	55
Central Vermont	645	Northeastern (S. C.)	55
Charlotte, Col. & Augusta	23	Northern Central	125
Chesapeake & Ohio	157, 429	Northern (New Hampshire)	125
Chesapeake & Ohio Canal	429	Northern Pacific	493
Chester	324	Ogdensburg & L. Champlain	398
Chester & Alton	141	Ontario Central	569
Chicago, Bur. & Quincy	317, 323	Ohio & Mississippi	602
Chicago & Eastern Illinois	698	Ohio Southern	405
Chicago, Mil. & St. Paul	175, 286, 296	Old Colony	205
Chicago & North Western	490, 497	Oregon & California	404
Chicago, R. I. & Pacific	310, 428	Oregon Ry. & Nav. Co.	434
Chicago, St. P. Minn. & Om.	190, 379	Oregon & Transcontinental Co.	516
Chicago & West. Michigan	704	Pacific Mail Steamship Co.	370
Cin. Hamilton & Dayton	370	Panama	217
Cin. Ind., St. L. & Chl.	386, 516, 590	Pennsylvania Company	563
Cin. & Eastern Ohio	71	Pennsylvania & N. Y.	190
Cleve. Col. Cin. & Indianapolis	245	Pennsylvania Railroad	157
Cleve. Tuscarawas V. & W.	190	Pennsylvania & Atlantic	246
Columbia & Greenville	7, 637	Pennsylvania & Perkiomen	324
Columbus, Rock. & Tol.	189	Perkiomen	324
Concord	339	Petersburg	194, 748
Conn. & Passumpsic Rivers	590	Philadelphia & Reading	7, 20
Connecticut River	70	Philadelphia, V. I. & Balt.	23
Delaware & Hudson Canal	101, 176	Pittsburgh & Castle Shannon	142
Delaware, Lack. & W.	71	Pittsburgh, Cincinnati & St. L.	292
Del. Lack. & W. Leased Lines	340	Pittsburgh & Lake Erie	23
Delaware Western	41	Portland & Ogdensburg	98
Denver & Rio Grande	71, 344	Portland & Rochester	129
Des Moines & E. Des Moines	189	Providence & Worcester	246
Detroit, Grand Haven & Mil.	404	Pullman's Palace Car Co.	549
Detroit, Lansing & No.	466	Queen Anne's & Kent.	386
Eastern R. & Ansonia	705	Richmond, Fredericksburg & Potomac	316
East Tenn. Va. & Georgia	720	Rochester & Pittsburgh	6
Eureka & Palmdale	324	Rome, Wat. & Ogdensburg	698
Fitchburg	340	Ruby Hill	324
Flint & Pere Marquette	466	Rutland	483
Galveston, Har. & San An'to.	406	St. Johnsbury & Lake Cham.	516
Georgia	340	St. L., Alton & Terre Haute	550
Grand Rapids & Indiana	324	St. Louis & San Francisco	41, 175
Grand Trunk	222	St. L. Y. & N. E. & St. Paul	190
Great Western	280	St. Paul & Duluth	217
Gulf, Col. & Santa Fe	698	St. Paul, Minn. & Manitoba	594
Hannibal & St. Joseph	176	Sandy River	190
Hartford, New Haven & Boston	324	Savannah, Fla. & Potomac	316
Houston	195	Savannah, Griffin & N. Ala.	720
Houston, East & West Texas	190	South Carolina	189
Houston & Texas Central	126	South Carolina Minor R.R.s	7
Huntingdon & P. D. Top Mt.	101	Southern Pacific	450
Illinois Central	96, 125	Sussex	386
Indiana, Bloom. & West.	402	Terre Haute & Indianapolis	483
Indianapolis & St. Louis	340	Terre Haute & Logansport	484
Iowa Minor Railroads	31	Texas & Pacific	483
Jacksonville & Breakwater	345	Troy & Greenfield	70
Kan. City, Ft. Scott & Gulf	310	Union Pacific	190
Kan. City Lawrence & So. Kan.	483	United New Jersey	449
Kentucky Central	195	U. S. Bond Stock Co. Home	155
Knox & Lincoln	142	Utica & Black River	190
Lake Erie & Western	675	Vermont Valley	403
Lake Shore & Mich. So.	271, 279	Vicksburg & Meridian	450
Lehigh Coal & Navigation Co.	126	Virginia Midland & West.	142
Lehigh Valley	41, 100	Virginia & Truckee	160
Little Rock & Ft. Smith	310	Wabash, St. L. & Pacific	194, 218
Long Island	71	Western Maryland	7, 675
Louisville, Cin. & Lexington	54	Western R. R. Association	38
Louisville & Nashville	622, 637	Western Union Telegraph	605
		West Jersey	622
		Wilmington & Northern	439
		Worcester & Nashua	439
		Wisconsin Central	370

Richmond, Fredericksburg & Potomac.

This company owns a line from Richmond Va., to Quantico, 83 miles. The following report for the year ending Sept. 30, was presented at the annual meeting last week.

The earnings for the year were as follows:	1881-82.	1880-81.	Inc. or Dec.	P. c.
Transportation	\$437,516	\$404,640	I.	32,876 8.1
Rents	2,359	2,288	I.	71 3.1
Total	\$439,875	\$406,928	I.	32,947 8.1
Expenses	267,331	198,187	I.	69,144 34.9
Net earnings	\$172,544	\$308,741	D.	\$36,197 17.3
Gross earn. p. m.	5,239	4,903	I.	336 8.1
Net earn. p. m.	2,079	2,515	D.	436 17.3
Per cent. of expenses	60.77	48.69	I.	12.08

The report of General Superintendent E. T. D. Myers says: "The Richmond & Petersburg Railroad Company's bridge across James River was burned on March 26, and trains did not pass again until May 30, during which time the passengers and freights were transferred over a distance of nearly two miles. This of course affected us unfavorably.

The business between points north of us and points on the Richmond & Danville system has, by the lease of the Virginia Midland Railroad on the one hand, and of the York River Railroad on the other, to the Richmond & Danville Railroad Company, been diverted from our line; and the line via West Point has bid for travel at very low rates. That our business under these adverse influences should have been so good is encouraging.

The local freights were diminished by the bad crops of 1881.

The increase in revenue from through freights is about

50 per cent., from mail service 20 per cent., and from local travel about the same—a justification of your action in reducing local fares.

The current expenses have heavily increased, viz., \$69,244.68. The causes of this are briefly: An extraordinary amount of steel rail (12 miles) laid, and many more crosses than usual; the heavily increased cost of railroad supplies; the burden of two serious accidents, of which one was mentioned in the last report, and one has occurred since; besides the necessary changes and adjustments of the service to the altered condition of its business, which, though profitable and essential to its welfare, does not afford so liberal a margin as formerly.

The fast mail south has continued to run smoothly and successfully in connection with the Atlantic-Continent Line, and may now be regarded as established in the public favor.

The wooden bridge across the Rappahannock has been for some time the cause of uneasiness because of the contiguity of buildings and liability of fire. It has been replaced by an iron structure of extraordinary strength.

Additions to the equipment were one passenger engine and three freight engines; 10 flat, 1 coal, 4 caboose and 6 gravel cars. The equipment is now sufficient for the present business.

The income account is as follows:

Net earnings, as above	\$172,543.58
Interest on bonds	\$60,869.25
Dividends on guaranteed stock	34,835.00
	95,704.25

Surplus \$76,839.33

The surplus shows a decrease of \$31,397.39, or 29.1 per cent., from the preceding year.

The President's report says: "The result of the year's operations, while not so favorable as the board had reason to anticipate at its commencement, still shows a fairly-earned dividend of 4 per cent. upon the common stock and dividend obligations of the company, with sufficient margin to warrant its declaration.

On July 1, 1882, \$23,490.25 of the 6 per cent. funded debt of the company became due, and was extended for 20 years at 5 per cent."

Boston & Maine.

This company owns a line from Boston to Portland, Me., 115.50 miles, with four short branches, 11 miles in all, making 126.50 miles owned. It leases the Newburyport road, 26.98 miles; the Danvers road, 9.26 miles; the Lowell & Andover, 10.10 miles; the West Amesbury Branch, 4.50 miles, and the Dover & Winnepesaukee, 29 miles, making 79.84 miles leased, and 206.34 miles owned and leased. The Methuen Branch (owned), 3.75 miles, is leased to the Manchester & Lawrence Company, leaving 202.59 miles worked. Most of the leased lines are practically owned by the company. The report is for the year ending Sept. 30.

The equipment consists of 86 locomotives, 12 snow-plows, 182 passenger-train cars and 1,949 freight and other cars; an increase of 2 locomotives, 6 passenger-train cars and 25 freight cars.

The general account is as follows, condensed:

Stock (received from sale of 70,000 shares)	\$6,921,274.52
Bonds	3,500,000.00
Bills payable	100,000.00
Accounts and balances	234,891.27
Profit and loss	1,937,502.13
Total	\$12,393,667.92
Road and equipment	\$10,755,010.26
Materials and fuel	216,480.44
Stocks, bonds, etc., leased lines	991,134.07
Other accounts, improvements, etc.	41,404.05
Notes and accounts receivable	166,965.41
Cash	222,613.68
	\$12,393,667.92

The bonds all bear 7 per cent. interest; there are two issues, one of \$1,500,000 due in 1893, and one of \$2,000,000 due in 1894. They are plain bonds, not secured by mortgage.

The traffic for the year was as follows:

	1881-82.	1880-81.	Increase.	P. c.
Train miles	1,881,82	1,880,81	91,551	4.9
Passengers carried	5,984,000	5,325,375	658,625	12.4
Passenger-miles	81,041,541	74,968,911	6,072,630	8.9
Tons freight carried	904,966	842,004	62,962	7.4
Ton-miles	44,882,394	41,880,063	2,992,331	7.1

In passenger traffic the gain was largely in local business. In freight traffic there was a loss in through business, but a large gain in local freights.

The earnings for the year were as follows:

	1881-82.	1880-81.	Increase.	P. c.
Passengers	\$1,593,117	\$1,480,534	I.	\$103,583 6.9
Freight	1,079,425	1,018,857	I.	60,568 5.8
Mail and express	95,784	92,824	I.	2,960 3.2
Rents, etc.	82,404	80,301	D.	3,897 0.1
Total	\$2,850,730	\$2,687,516	I.	\$163,214 6.1
Expenses	1,861,281	1,682,657	I.	198,624 11.9
Net earnings	\$989,449	\$1,024,859	D.	\$35,410 3.4
Gross earn. p. m.	14,071	13,266	I.	805 6.1
Net " " "	4,884	5,059	D.	175 3.4
Per cent. of exps.	65.29	61.87	I.	3.42

In 1880-81 the rentals of leased lines were included in expenses. Last year they have not been included, and the amount has accordingly been deducted from the previous year's expenses in making comparisons.

Expenditures on improvement account were \$133,576.72, of which the sum of \$87,111.72 was for new second track. Of the whole amount paid for improvements the sum of \$65,000 was paid from the fund reserved for that purpose from the previous year, and the balance of \$68,576.72 was charged to the income of the year.

The result of the year was as follows:

Net earnings	\$989,449.38
Improvement account	\$68,576.72
Rentals of leased lines	87,200.00
Interest on bonds	245,000.00
Dividends, 8 per cent.	500,000.00
	960,776.72

Balance \$28,672.66

This balance has been placed to the credit of improvement account.

The net balance applicable to dividends was \$588,672.66, against \$626,593.83 in the previous year, a decrease of \$37,921.17, which is accounted for by the increased renewals and improvements made.

The equipment during the year has been fully kept up. Three new passenger locomotives have been built in the shops. Another large and powerful locomotive for freight will be ready for service in a few weeks. Many of the engines have had extensive repairs during the year, and it is now believed that the motive power will compare favorably with that of any road leading out of Boston. There have been built in the company's shops at Lawrence during the past year two parlor cars, five first-class passenger cars, two combined passenger and baggage cars, and 47 freight cars. One parlor car has been purchased, and there are now 50 freight cars under contract, 25 of which have been delivered. The second track has been extended the past year from East Kingston to Exeter, 4½ miles, and from a point

4½ miles west of Portland to Scarboro, 2½ miles. The alignment of the road has been much improved by the removal of a very bad reverse curve. During the past year it has been found necessary to make large repairs on the Charles and Miller River bridges, in Boston. Four new iron bridges of substantial construction have been built over highways. At Mitchell's Crossing, in Kennebunkport, the highway has been changed by constructing a new one, a half-mile in length, thus dispensing with a bridge over the highway at that point. An overhead bridge has been built at South Newmarket, at considerable expense, under an agreement with the town to discontinue a dangerous grade crossing. The work of filling Prison Point Bay has been continued. About four thousand yards of granite paving have been laid, which gives a good yard for the delivery of bulk freight. A large addition has been made to the bridge at Miller's River, which will add much to the freight facilities. There have been laid down during the year 1,803 tons of steel rails and 32 tons of iron rails, of which 531 tons of steel were laid down in the new second track. The past year 141,405 ties have been laid, in addition to those used in the new second track, being 77,429 in excess of last year. New side tracks have been laid aggregating 4.64 miles.

Concerning the proposed elevated road into Boston the report of the President says: "At our last annual meeting the directors asked of the stockholders authority to take such action as might be found necessary to elevate two or more tracks for passenger traffic from Somerville to Boston, thus avoiding the crossings of the Eastern and Fitchburg railroads and several street crossings at grade, and also increasing our freight facilities. Under the authority then granted by you, a petition was presented to the Legislature asking permission to construct such tracks and take land where necessary. The project was strongly opposed by one or more railroads entering Boston on the north side, and by some of the citizens of Somerville, which resulted in the referring of the matter to the next Legislature, and the passing of a vote instructing the Railroad Commissioners to inquire into the practicability and expediency of causing the railroads on the north side of the city to dispense with grade crossings and to report to the next General Court such legislation as they might deem expedient. Under these circumstances your directors have thought it advisable to await the report of the Railroad Commissioners before taking further action in the matter."

Richmond & Petersburg.

This company owns a line from Richmond, Va., to Petersburg, 22.5 miles, with a branch to Port Walthall, 2.5 miles, making 25 miles in all. The report is for the year ending Sept. 30.

The stock and bonds are as follows:

Stock.....	\$1,009,300
Bonds.....	200,000
Total.....	\$1,209,300

The funded debt consists of \$100,000 first-mortgage 8 per cent. bonds, \$50,000 consolidated 7 per cent. bonds, and \$50,000 consolidated 6 per cent. bonds, the annual interest charge being \$14,500. During the year \$25,000 first-mortgage bonds matured and were paid off, being replaced by \$25,000 consolidated bonds.

The earnings for the year were as follows:

	1881-82.	1880-81.	Inc. or Dec.	P. c.
Earnings.....	\$174,378	\$185,905	D. \$11,527	6.2
Expenses.....	117,781	99,978	I. 17,803	17.8
Net earnings.....	\$56,597	\$85,927	D. \$29,330	34.1
Gross earn. per mile.....	6.975	7.436	D. .461	6.2
Net.....	2.264	3.437	D. 1.173	34.1
Per cent. of expenses.....	67.55	53.77	I. 13.78	.....

The decrease in earnings and the increase in expenses were almost entirely due to the destruction of the James River bridge by fire, which made a troublesome and expensive transfer necessary for two months, and caused the diversion of much through business.

Passenger trains earned \$2.10 per mile run, and freight trains \$2.72, the average for all trains being \$2.35 per mile. The result of the year was as follows:

Net earnings.....	\$56,596.63
Interest paid.....	16,954.31
Surplus.....	\$39,642.32

The usual dividend of 3 per cent. was paid Jan. 1. The July dividend was passed on account of the loss in earnings and increased expenses caused by the fire.

The President's report refers at length to the burning of the James River bridge on March 26 last. It was found impossible to replace it immediately with a new iron bridge, as at first proposed, and a temporary bridge was accordingly built, which is described as follows, and which required nearly two months to build, much delay resulting from the difficulty of securing suitable lumber and skilled workmen:

"The work is nearly three-fourths of a mile in length and 60 ft. high, composed of bents of two-story trestle work, placed about 14 ft. apart in the clear. The posts of the bent consist of two vertical and two inclined pine poles, averaging twelve inches in diameter; the caps, sills, runners, lateral and longitudinal braces are of sawed pine lumber; the bracing at each point of contact with posts, caps, sills, etc., is firmly bolted with three-quarter and one-inch bolts. Heart-pine stringers composed of two pieces 7½ x 15 in., bolted together, are under each rail; the white oak cross-ties have heavy guard timbers securely bolted to them.

"The cost of this trestle, together with the outlay for depot and tracks at Manchester to accommodate the traffic while the gap was open, and the cost of laying a rail on the Tredgar bridge, have not been included in operating expenses, but have been kept as a special account, the amount of which, after crediting all the old material sold, is \$56,155. The bridge was insured for \$50,000, which was paid by the various insurance companies, and credited to this account, leaving a balance against it of \$6,155. Estimating the value of the bridge that was burned at \$40,000 more than the value of the trestle now in use, and also estimating the increased expenses caused by the break and loss of revenue from decreased traffic, the direct loss to the company from the fire is about \$60,000.

"Its estimated strength is equal to ten times the maximum load that can be put on it. Each bent rests on the rock bottom of the river, so that there can be no sinking. This trestle bridge is, therefore, perfectly strong and safe for present business, but it is only temporary in its character; the pine poles will rot, and the best material in it would not last long, exposed as it is to the weather. It has, therefore, been determined to erect as soon as convenient a permanent iron bridge of the very best construction, capable of carrying the largely increased weight of equipment now in use. Some of the spans will be filled up, and this part of the work has been begun. Estimates have been received from several builders of iron bridges for the iron work, and it is proposed to build a part of the bridge next year, and the remainder the following year."

A number of suits have been begun against the company for damages by owners of buildings which were destroyed by fire caught from the bridge.

Mississippi & Tennessee.

This company owns a line from Memphis, Tenn., to Grenada, Miss., 100 miles. The report is for the year ending Sept. 30.

The general account is as follows:

Stock.....	\$825,455.00
Funded debt.....	2,079,298.35
Floating debt.....	82,301.79
Receipts.....	406,651.26
Profit and loss.....	281,979.07
Total.....	\$3,675,685.47
Cost of property.....	\$3,038,010.22
Expenses and interest.....	441,663.56
Cash and assets.....	196,011.69
Total.....	3,675,685.47

The funded debt was increased by \$96,129.30 during the year. The cost of road was increased by \$5,173.03.

Locomotives ran 241,764 miles during the year at an average cost of 20.21 cents per mile. The cotton carried was 87,620 bales, of which 41,729 bales were local and 45,891 bales through. The decrease from the previous year was 91,137 bales, or 50.9 per cent.

The earnings for the year were as follows:

	1881-82.	1880-81.	Inc. or Dec.	P. c.
Freight.....	\$328,030	\$359,581	D. \$70,551	19.6
Passage.....	101,441	121,406	D. 14,965	12.3
Mail, etc.....	11,190	11,189	D. 1	0.1
Total.....	\$440,661	\$492,176	D. \$51,515	10.5
Expenses.....	254,159	297,840	D. 43,681	14.7
Net earnings.....	\$186,502	\$194,336	D. \$7,834	4.0
Gross earn. per mile.....	4.067	4.922	D. .855	17.4
Net earn. per mile.....	1.535	1.943	D. .408	21.4
Per cent. of exp's.....	62.50	60.52	I. 1.98	.....

During the year 9.37 miles of steel rails, 2.30 miles of re-rolled iron rails and 54,608 new ties were laid. The road needs at least 10 miles of new rails this year, and some new passenger cars. There were 4,150 ft. of new trestle built.

General Superintendent Burke's report says: "Your tracks through the city of Memphis remain at the former gauge, 5 ft. Since the completion of the Chesapeake, Ohio & Southwestern Railroad to this city we have suffered some inconvenience and loss of business by not being able to transfer their cars through the city. In order to preserve our connections with all the roads entering the city from the East and West an additional track of 4 ft. 8½ in. gauge should be laid on the same ties. By this, cars of either 5 ft. or 4 ft. 8½ in. gauge could be transferred. The additional track, with frogs, will cost about \$12,000."

Vice-President White's report says: "The great falling off in both our gross and net receipts was caused by the partial failure of the cotton crop in this section. We did not transport half as much cotton last season as the year before. We are 91,137 bales short. While the receipts of the company are not what we would like we consider them good for the condition of our country after such a crop. We anticipate a very promising business for the company the coming year. We had but one small accident during the year, which caused but slight damage and little expense. A few damage suits were brought against the company, all of which have been satisfactorily compromised at but small cost to the company. * * * Since the date of the report the large debt due the state of Mississippi has been paid. Receipts for the month of October this year are about \$19,000 more than for October of last year. The present season's business is likely to be the largest the company ever enjoyed."

Mexican Railway.

The report for the half year ended June 30, states that the main line consists of 293 miles, and the sidings of 15 miles, the same as at date of last report. The statement below shows the gross earnings of the line for the half year under review and for the two previous half years, summarized from the revenue accounts. The average earnings per mile per week for the three half years were \$385 and \$311 for the first and second halves of 1881, and \$364 for the first half of 1882, the dollar being taken for the purpose of calculation and comparison at the customary value of four shillings:

	Jan. to June, 1882.	July to Dec., 1881.	Jan. to June, 1881.
Passengers.....	\$330,025	\$271,615	\$274,295
Merchandise.....	2,107,960	1,836,720	1,970,555
Pulque.....	194,105	187,615	187,985
Sundries.....	128,460	100,650	96,050
Total.....	\$2,760,545	\$2,396,605	\$2,538,890

The approximate earnings of the first three months of the present half year, as advised by telegraph, were \$1,560,000, as compared with \$1,177,000 during the corresponding period of 1881.

Jalapa Line, 70½ miles—(of which 9½ miles are run on main line metals).—The earnings of the half year amounted to \$58,875, as compared with \$55,405 and \$55,100 during the two preceding half years. The following are the figures for each period:

	Jan. to June, 1882.	July to Dec., 1881.	Jan. to June, 1881.
Passengers.....	\$14,720	\$12,070	\$12,220
Merchandise.....	40,985	39,955	41,020
Sundries.....	3,765	3,070	2,160
Total.....	\$59,470	\$55,095	\$55,400

The approximate earnings of the first three months of the current half year, as advised by telegraph amounted to \$26,500, as against \$26,000 in 1881.

General.—The directors have the pleasure of submitting to the proprietors a statement of accounts for the half-year ended June 30, 1882, which enables them to pay the interest on the debenture stock and to propose to the proprietors to declare full dividends on the first and second preference share capital stocks, and a dividend at the rate of 9½ per cent. per annum on the ordinary share capital stock. The sum at the disposal of the company after payment of the interest on the debenture stock, \$60,000, is \$247,433. The full dividends for the half-year on the first and second preference stocks absorb \$102,164 and \$20,638 respectively, leaving a sum of \$124,631. After a dividend at the rate of 8 per cent. per annum on the ordinary share capital stock has been provided for, absorbing \$90,188, there are, under the articles of association, to be deducted the sums of \$988 for payment to the concessionaire, \$949 to the directors, and \$949 for the creation of a reserve fund to meet contingencies. After these deductions, which will be held in suspense until the accounts for the year are closed, have been made, there remains a sum of \$21,834, to which is to be added \$232 brought forward, making in all \$22,156 available for further distribution. With this sum of \$22,156 and the sum of \$90,188 above mentioned, making a total sum of \$112,345, the directors propose that there shall be paid a dividend of 4½ per cent. for the half-year, free of income-tax, absorbing \$110,669, and that the balance of \$1,676 shall be carried forward to the credit of the holders of ordinary stock. The directors have much pleasure in presenting to the proprietors a statement of accounts which permits the distribution of a dividend at the rate of 9½ per cent. per annum. It reveals a state of things which

may be regarded as highly satisfactory, since it enables the proprietors to enter on their compensation for the disappointments of the years when there was little or no dividend; since it will encourage the directors to persevere in the policy of making such reductions of tariffs as are best fitted to stimulate the enterprise of the country; and, lastly, since it may be expected to increase the flow of capital into Mexico, by showing that results progressively better have attended the working of the earliest in date of Mexican railway companies.

A comparison between the returns of earnings and expenditure for the half-year now under consideration (the first half of 1882) with those for the corresponding half-year of 1881, shows a gross increase of \$44,411, and a net increase of \$24,297. The traffic has thus been considerably larger, but the working expenses have increased. This increase is principally due to the augmented cost of fuel, owing to the substitution of coal for wood, of which there was not an adequate supply in the country, and to the more extensive repairs and renewals in the locomotive department, necessitated by the increasing traffic. The weekly statements received in London show that there has been already a very considerable increase in the gross receipts for the current half-year, amounting from July 1 to Nov. 4, to a total of \$111,500 as compared with the corresponding week of the last half year of 1881, when a dividend at the rate of 4½ per cent. per annum was declared, and of \$76,200 as compared with the corresponding number of weeks in the first half year of 1881, when a dividend at the rate of 48 per cent. per annum was declared. The statements appended to the report show that the total amount of goods carried in the half year now under consideration (the first half year of 1882) was 136,306 tons, as against 124,586 in the corresponding period of 1881, and this total increase was obtained although 7,000 tons less of railway material had been carried. The most satisfactory item of increase is that in grain, which is principally owing to the down traffic in cereals for shipment to the Gulf ports and foreign countries.

The proprietors will remember that the directors have already asked, and received permission, to devote three sums of \$80,000 each out of the proceeds of the subvention to the improvement of the company's undertaking and the development of the traffic. This total of \$180,000 has already been absorbed, partly in the construction of new stations and other local works, and chiefly in the purchase of rolling-stock which has been bought or contracted for. Very large additions have been made to the stock of engines, wagons, and carriages at the command of the company, but the rapid increase of the traffic makes a still further provision under these heads indispensable, and the directors will, therefore, submit a resolution to the proprietors to sanction the application of a further sum of \$80,000 out of the proceeds of the subvention to the purposes above mentioned.

There has been no change worth noticing in the price of silver. The directors have been informed that the abolition of the Mexican export duties on silver came into operation on Nov. 1. The current subvention due from the Mexican government has been regularly paid. Mr. Penney, who has been for eight years the Auditor of the company in Mexico, has resigned his post, and the directors wish to record their sense of the great zeal and thorough efficiency with which he has fulfilled all the duties of his office.

Naugatuck.

This company owns a line from Stratford, Conn., to Winsted, 57 miles, and it has running rights over the New York, New Haven & Hartford tracks from Stratford to Bridgeport, 4 miles. It also works under contract the Watertown & Waterbury road, a branch 4½ miles long. The report is for the year ending Sept. 30.

The general account is as follows, condensed:

Stock.....	\$2,000,000.00
Current accounts and September expenses.....	71,385.69
Profit and loss.....	342,845.77
Total.....	\$2,414,231.46

Road and equipment.....	\$2,137,570.32
Stocks and bonds.....	12,900.00
Real estate.....	30,000.00
Materials.....	39,964.13
Bills and accounts receivable.....	69,552.21
Cash.....	124,544.80
Total.....	\$2,414,231.46

The company has no funded debt and, in fact, no debt of any description, the current accounts and traffic balances being very much less than the cash and receivables.

The train mileage was as follows:

	1881-82.	1880-81.	Increase.	P. c.
Passenger.....	154,650	283,494	23,496	8.3
Freight.....	152,340	152,340	.....	.....
Service and switching.....	55,756	38,602	17,154	44.4
Total.....	362,746	322,096	40,650	12.6

Of the train mileage last year 9,500 miles were on the Watertown & Waterbury line.

The earnings for the year were as follows:

	1881-82.	1880-81.	Increase.	P. c.
Freight.....	\$435,409	\$363,510	\$71,899	19.7
Passengers.....	253,885	226,945	26,940	11.9
Mail, etc.....	25,604	23,956	1,648	6.9
Total.....	\$714,898	\$614,411	\$100,487	16.4
Expenses.....	491,113	413,020	78,093	18.9
Net earnings.....	\$223,785	\$201,391	\$22,394	11.2
Gross earnings per mile.....	11.624	9.990	1.634	16.4
Net.....	3.639	3.275	.364	11.2
Per cent. of expenses.....	68.70	67.22	1.48	.....

Expenses include taxes, which were \$27,247.99 last year, against \$21,324.01 the previous year. The taxes were over 5½ per cent. of the total expenses.

The income account is as follows:

Net earnings.....	\$223,784.92
Dividends, 10 per cent.....	200,000.00
Surplus.....	\$23,784.92
Balance, Sept. 30, 1881.....	319,060.85
Balance, Sept. 30, 1882.....	\$342,845.77

The report says: "The gross earnings of this year show an increase of over 16 per cent. over those of the previous year, while the net earnings, in consequence of permanent expenditures for increased business facilities, required by the increased service, do not produce a corresponding increase. They have been sufficient to meet our taxes and pay our usual dividends and leave a moderate amount to add to the surplus of the company. The tendency to diminished rates, increased cost of service, and increased equipment and other business facilities, prevents any material increase of surplus account.

"Among the improvements and additions to the line during the year, are the completion of new engine house and buildings and enlargement of machine shop at Bridgeport; new brick station house at Thomaston; remodeled station at Beacon Falls; a new iron bridge over Naugatuck river on Watertown line; two small iron bridges at Ansonia, one near Burrville; two first-class locomotives and 53 freight cars."